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MISSISSIPPI · SALT · QUINCY RIVER BASIN

DEIMEKE LAKE DAM
AUDRAIN COUNTY, MISSOURI
MO. 11163

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

DECEMBER 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO
ATTENTION OF

SUBJECT: Deimeke Lake Dam (MO. 11163) Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Deimeke Lake Dam (MO. 11163).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) The spillways will not pass 50 percent of the Probable Maximum Flood
2) Overtopping could result in dam failure
3) Dam failure significantly increases the hazard to loss of life downstream

SUBMITTED BY: SIGNED — 18 DEC 1980
Chief, Engineering Division — Date

APPROVED BY: SIG — 22 DEC 1980
Colonel, CE, District Engineer — Date

A

DEIMEKE LAKE DAM

AUDRAIN COUNTY, MISSOURI

MISSOURI INVENTORY NO. 11163

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PREPARED BY

CONSOER, TOWNSEND AND ASSOCIATES, LTD.

ST. LOUIS, MISSOURI

AND

PRC ENGINEERING CONSULTANTS, INC.

ENGLEWOOD, COLORADO

A JOINT VENTURE

UNDER DIRECTION OF

ST. LOUIS DISTRICT, CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

DECEMBER 1980

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Deimeke Lake Dam, Missouri Inv. No. 11163
State Located:	Missouri
County Located:	Audrain
Stream:	An unnamed tributary of Davis Creek
Date of Inspection:	July 10, 1980

Assessment of General Condition

Deimeke Lake Dam was inspected by the engineering firms of Consoer, Townsend and Associates, Ltd. and PRC Engineering Consultants, Inc. (A Joint Venture) of St. Louis, Missouri according to the U. S. Army Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams" and additional guidelines furnished by the St. Louis District of the Corps of Engineers. Based upon the criteria in the guidelines, the dam is in the high hazard potential classification, which means that loss of life and appreciable property loss could occur in the event of failure of the dam. Within the estimated damage zone of one mile downstream of the dam there are two dwellings and one trailer that may be subjected to flooding, with possible damage and/or destruction, and possible loss of life. Deimeke Lake Dam is in the small size classification since it is 24 feet high, and impounds more than 50 acre-feet but less than 1,000 acre-feet of water.

The inspection and evaluation of the consultant's inspection team indicate that the spillway of Deimeke Lake Dam does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. Deimeke Lake Dam, being a small size dam with a high

hazard potential, is required by the guidelines to pass from one-half of the Probable Maximum Flood to the Probable Maximum Flood without overtopping. Considering the number of inhabited dwellings located downstream of the dam, the PMF is considered the appropriate spillway design flood for Deimeke Lake Dam. The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. It was determined that the reservoir/spillway system can accommodate approximately 20 percent of the Probable Maximum Flood without overtopping the dam. The evaluation also indicates that the reservoir/spillway system of Deimeke Lake Dam can accommodate the one-percent chance flood (100-year flood) without overtopping the dam.

Other deficiencies noted by the inspection team were: the damage done to the downstream slope due to grazing livestock, the erosion on the upstream slope due to wave action, lack of adequate surfacing on the top of dam to prevent damage due to vehicular traffic and surface erosion, a need for periodic inspection by a qualified engineer and a lack of maintenance schedule. The lack of seepage and stability analyses on record is also a deficiency that should be corrected.

It is recommended that the owner take action to correct or control the deficiencies described above.

Walter G. Shifrin, P.E.

STATE OF MISSOURI
WALTER
G SHIFRIN
NUMBER
E-8834
REGISTERED PROFESSIONAL ENGINEER

Overview of Deimeke Lake Dam

NATIONAL DAM SAFETY PROGRAM

DEIMEKE LAKE DAM, I.D. No. 11163

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEIMEKE LAKE DAM, Missouri Inv. No. 11163

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The Dam Inspection Act, Public Law 92-367 of August, 1972, authorizes the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspections. Inspection for Deimeke Lake Dam was carried out under Contract DACW 43-80-C-0094 between the Department of the Army, St. Louis District, Corps of Engineers, and the engineering firms of Consoer, Townsend & Associates, Ltd., and PRC Engineering Consultants, Inc. (A Joint Venture), of St. Louis, Missouri.

b. Purpose of Inspection

The visual inspection of Deimeke Lake Dam was made on July 10, 1980. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

This report summarizes available pertinent data relating to the project, presents a summary of visual observations made during the field inspection, presents an assessment of hydrologic and hydraulic conditions at the site, and of the structural adequacy of the various project features and assesses the general condition of the dam with respect to safety.

Subsurface investigations, laboratory testing and detailed analyses were not within the scope of this study. No warranty as to the absolute safety of the project features is implied by the conclusions presented in this report.

It should be noted that in this report reference to left or right abutments is viewed as looking downstream. Where left abutment or left side of the dam is used in this report, this also refers to the southeast abutment or side, and right to the northwest abutment or side.

d. Evaluation Criteria

The inspection and evaluation of the dam is performed in accordance with the U.S. Army Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams" and additional guidelines furnished by the St. Louis District office of the Corps of Engineers for Phase 1 Dam Inspection.

1.2 Description of the Project

a. Description of Dam and Appurtenances

The following description is based upon observations and measurements made during the visual inspection and conversations with Mr. Kenneth Deimeke, the owner's representative. Design drawings and calculations were available and are included as part of this report (see Plates 4 through 7). Any discrepancies between the design drawings and our field measurements will be noted in Section 2.1.

The dam is a zoned, rolled, earthfill structure with a straight alignment between soil abutments. A plan and elevation of the dam are shown on Plate 2, and Photos 1 through 3 show views of the dam. The dam was constructed with select clay material forming a 12-foot-wide core founded in hard clay and with less select clay materials forming the shells, according to Mr. Deimeke. The top of dam width is 14 feet and the axis length of the top of the dam was measured as 375 feet. The top of dam elevation is assumed to be 773 feet above mean sea level (M.S.L.). The height of the dam at the maximum section is 24 feet. The top of dam was measured to be level. Both slopes were measured as 1V on 2.75H. The upstream slope is not protected by riprap. The entire exposed embankment slopes are protected by various grass covers.

A principal and an emergency spillway were provided for this dam. The principal spillway is an 8-inch diameter steel pipe placed through the embankment and is located at about the mid-section of the dam (see Photo 5). The pipe is about 107 feet long and is set on a grade of approximately 18 percent. The crest elevation from field measurements is at 768.33 feet above M.S.L. assuming the top of dam to be at 773 feet above M.S.L. According to the design drawings and conversations with Mr. Deimeke, two 5-foot square anti-seep collars were provided along the pipe at distances

of 20 and 40 feet from the inlet of the pipe. A 1-foot square plate was to be attached to the top of the pipe at the inlet as an anti-vortex device, according to the design drawings. However, no anti-vortex plate was found attached to the pipe during the inspection. Flows through the pipe drop approximately 3 feet at the outlet end into a discharge pool before entering the downstream channel (see Photo 6).

The emergency spillway is a trapezoidal-shaped, open channel cut into the left abutment (see Photo 7). The control section of the spillway has a bottom width of 18 feet, a top width of 44 feet, and a crest elevation of 771 feet above M.S.L., which is 2 feet below the top of dam. A training berm was constructed on the right side of the spillway at a right angle to the dam and it extends a distance of 50 feet downstream of the embankment (see Photo 8). The slope of the approach to the emergency spillway crest is about 5 percent, the crest itself is level for a distance of 14 feet, and the slope of the discharge channel is 3 percent for a distance of 50 feet. At the end of the training berm, flows from the spillway will make an approximately 90° bend and flow down the left abutment area to the downstream channel (see Photo 4).

No low level outlets or outlet works were provided for this dam; however, a portable, diesel-powered, centrifugal pump is used at the damsite (see Photo 11). The pump is used to pump water from the reservoir to irrigate row crops in the reservoir area. According to Mr. Diemeke, the pump has a capacity of 1,000 gallons per minute (g.p.m.) and can be used to drain the reservoir if needed. The pump is generally used during the summer months and is operable.

b. Location

Deimeke Lake Dam is located in Audrain County in the State of Missouri, and crosses an unnamed tributary of Davis Creek. The community of Mexico is about 1-1/2 miles to the southeast. The Deimeke Lake Dam location on the 7.5 minute series of the U.S. Geological Survey maps is found in Section 15 of Township 51 North, Range 9 West, of the Mexico West, Missouri Quadrangle Sheet.

c. Size Classification

The impoundment of Deimeke Lake Dam is less than 1,000 acre-feet but more than 50 acre-feet, and the height is 24 feet. Therefore, the size is determined to fall in the "small" category, according to the "Recommended Guidelines for Safety Inspection of Dams" by the U.S. Department of the Army, Office of the Chief Engineer.

d. Hazard Classification

The dam has been classified as having a "high" hazard potential in the National Inventory of Dams, on the basis that in the event of failure of the dam or its appurtenances, excessive damage could occur to downstream property, together with the possibility of the loss of life. The findings of the consultant's inspection team concur with this classification. Within the estimated damage zone, extending one mile downstream of the dam, are two dwellings and one trailer.

e. Ownership

Deimeke Lake Dam and Reservoir are privately owned by Mr. Joe Deimeke. His mailing address is as follows: Route 5, Mexico, Missouri, 65265.

f. Purpose of Dam

The dam was constructed to impound water for irrigation purposes.

g. Design and Construction History

Deimeke Lake Dam was designed in 1976 by the Department of Agriculture, Soil Conservation Service, of the Mexico, Missouri office. According to Mr. Kenneth Deimeke, the dam was constructed according to the Soil Conservation Service design specifications. The construction of the dam was completed in 1976 by Nelson Wilson of Mexico, Missouri, a local contractor.

h. Normal Operational Procedures

Normal operational procedure is to allow the reservoir to remain as full as possible while the water level below the principal spillway crest is controlled by rainfall, runoff, evaporation, and the quantity of water used for irrigation purposes.

1.3 Pertinent Data

a. Drainage Area (square miles): 0.21

b. Discharge at Damsite

Estimated experienced maximum flood (cfs): 5

Estimated ungated spillway capacity with reservoir at top of dam elevation (cfs): 326

c. Elevation (Feet above M.S.L.)

Top of dam:** 773

Spillway crest:

Principal Spillway 768.33

Emergency Spillway 771

Normal Pool: 768.33

Maximum Experienced Pool: 771

Observed Pool: 766

d. Reservoir

Length of pool with water surface at top of dam elevation (feet): 1100

e. Storage (Acre-Feet)

Top of dam: 98.7

Spillway crest:

Principal Spillway 58.3

Emergency Spillway 79.7

Normal Pool: 58.3

Maximum Experienced Pool: 79.7

Observed Pool: 42.5

f. Reservoir Surfaces (Acres)

Top of dam: 11

Spillway crest:

Principal Spillway 7.4

Emergency Spillway	8.7
Normal Pool:	7.4
Maximum Experienced Pool:.	8.7
Observed Pool:	6.3

g. Dam

Type:.	Rolled, Earthfill
Length:.	375 feet
Structural Height:	24 feet
Hydraulic Height:*	24 feet
Top width:	14 feet
Side slopes:	
Downstream	1V on 2.75H
Upstream	1V on 2.75H (Above water surface)
Zoning:	Three zones, 1. Impervious select clay core. 2. Shells, upstream and downstream of less select clay material.
Impervious core:	Clay Core
Cutoff:.	12-foot wide core trench
Grout curtain:	Unknown
Freeboard above normal reservoir level:. . .	4.67 feet
Volume:.	16,740 cu.yds. (SCS Design Drawings)

h. Diversion and Regulating Tunnel . . . . None

i. Spillway

Type:	
Principal Spillway	Steel pipe, uncontrolled
Emergency Spillway	Earthcut channel, uncontrolled
Length of crest:	
Principal Spillway.	NA, 8-inch diameter pipe
Emergency Spillway.	18 feet
Crest Elevation (feet above MSL):	
Principal Spillway.	768.33
Emergency Spillway.	771

j. Regulating Outlets . . . . . None, however, the portable irrigation pump used for crop irrigation can be utilized to drain the reservoir if needed. Pertinent data relating to the pump follows:

Type:	Diesel powered, centrifugal pump (portable)
Location:	On the north side of the reservoir (on the day of the inspection).
Usage:	To supply water for crop irrigation on the reervoir rim.
Closure:	None
Maximum Capacity:	1,000 gpm (reportedly)

* The hydraulic height of the dam is the vertical distance from the lowest point on the downstream toe to the top of dam or the maximum water surface, if below the top of dam.

** The elevation of top of dam was assumed from U.S.G.S. Mexico West Missouri Quadrangle topographic map. The elevations of other features of the dam were determined using this elevation and field measurements.

SECTION 2: ENGINEERING DATA

2.1 Design

Design drawings and hydraulic and hydrologic calculations were made available from the Soil Conservation Service. The design information obtained from the SCS is dated October of 1976. It appears that the dam was built according to the design drawings, except for some descrepancies. According to the design drawings, the upstream and downstream slopes were to be at 1V on 4H and 1V on 3H, respectively; however, field measurements indicate both slopes are 1V on 2.75H,

2.2 Construction

No documented data concerning the construction of the dam was available for this report. The only accounts of the construction were obtained through conversations with Mr. Kenneth Deimeke.

According to Mr. Deimeke, the compaction of the embankment was achieved by the activity of the earthmoving equipment across the embankment. No compaction control was employed. Mr. Deimeke also stated that a 12-foot wide core trench was excavated to a hard clay foundation parallel to the dam axis. This agrees with design drawings; however, the core trench is shown to be 10-feet wide.

2.3 Operation

No operational records are available for Deimeke Lake Dam.

2.4 Evaluation

a. Availability

The availability of engineering data is fair and consists of the design sketches, engineering computations, State Geological Maps, a general soils map published by the Soil Conservation Service, and U.S.G.S. Quadrangle Sheets. No data were available with regard to subsurface investigations or soil testing for the dam. Information on design hydrology and hydraulic design is available and is included in this report (see Plates 6 and 7). No information was available on construction or operation of the dam, other than the information obtained from Mr. Deimeke.

b. Adequacy

The conclusions presented in this report are based on field measurements, the available engineering data, past performance, and present condition of the dam. The available data, including the field measurements taken by the field inspection team, are considered adequate enough to evaluate the hydraulic and hydrologic capabilities of the dam. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions and made a matter of record.

c. Validity

A set of SCS design drawings and hydrologic and hydraulic design calculations were available for review. From field measurements and conversations with Mr. Deimeke, the dam appears to have been constructed according to the available drawings, except for the discrepancies described in Sections 2.1 and 2.2. The discrepancies do not appear to have affected the stability of the dam. The

hydraulic calculations show that the dam and spillways were designed to pass at least the 50-year flood (two-percent chance flood). From our calculations (see Section 5.1d), it was determined that the dam and spillways are capable of passing the 100-year flood (one-percent chance flood) without overtopping the dam.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

A visual inspection of the Deimeke Lake Dam was made on July 10, 1980. The following persons were present during the inspection:

Name	Affiliation	Disciplines
Dr. M.A. Samad	PRC Engineering Consultants, Inc.	Project Engineer, Hydraulics and Hydrology
Mark Haynes, P.E.	PRC Engineering Consultants, Inc.	Civil and Mechanical
Razi Quraishi, R.P.G.	PRC Engineering Consultants, Inc.	Geology
Zoran Batchko	PRC Engineering Consultants, Inc.	Soils
Kevin J. Blume	Consoer, Townsend & Assoc., Ltd.	Civil and Structural
Kenneth Deimeke	Owner's Representative	

Specific observations are discussed below.

b. Dam

The top of dam serves as an access road for farm equipment (see Photo 2). The top of dam has sparse grass cover but very little irregularity due to vehicular travel across it. According to Mr. Deimeke, the dam has never been overtopped and no evidence indicating the contrary was observed.

The downstream slope from the top of dam down to a cattle-restraining fence (see Photo 3) had dense, waist-high, grass cover. The downstream face below the cattle-restraining fence has very little grass cover and is being worn down into small benches due to the cattle that traverse the slope while grazing. A small, 20-foot diameter, dish-shaped depression approximately 6 to 12 inches deep was observed above the area where the principal spillway pipe exits near the toe. However, the depression did not indicate an instability of the embankment.

The upstream slope has no riprap protection. Only small scallops due to wave action were visible on the slope. Two distinct types of vegetation cover the upstream slope (see Photo 1). Dense, tall grass extends down to approximately 4 feet below the top of dam. Sparse, lush, leafy plants and small bushes extend down the upstream face to below the water line.

There is no evidence of seepage or leakage through or below the dam. The training berm of the emergency spillway directs flows away from the left downstream embankment abutment contact. No signs of past or present instability were seen on the embankment.

Both abutments slope gently upward from the top of dam. No instabilities, seepage, or erosion were observed on either abutment.

No evidence of burrowing animals was observed on either of the abutments or the embankment.

c. Project Geology and Soils

(1) Project Geology

The damsite is located on an unnamed tributary of Davis Creek in the Dissected Till Plains Section of the central Lowland Physiographic Province. Loess-mantled Kansas drift covers the surface of most of the Dissected Till Plains Section. This section is distinguished from the Young Drift Section to the north and from the Till Plains on the east by the stage it has reached in the post-glacial erosion cycle. Broadly generalized, this section is a nearly flat till plain submature to mature in its erosion cycle.

The topography at the damsite is rolling with gentle slopes and U-shaped valleys. Elevations of the ground surface range from 780 feet above M.S.L. at the damsite to 850 feet above M.S.L. approximately four miles southwest of the damsite. The reservoir slopes are in the range of 10° to 15° from the horizontal and appear to be stable. The area near the damsite is covered with slope wash deposits of glacial-fluvial origin and loess.

The regional bedrock geology beneath the glacial outwash deposits in the damsite area as shown on the Geologic Map of Missouri (1979), (see Plate 8), consists of Pennsylvanian age rocks (the Pleasanton-Marmaton-Cherokee Group), Mississippian age rocks (the Burlington Formation and the Chouteau Group), Devonian age rocks (the Sulphur Springs Group consisting of Bushberg Sandstone, Glen Park Limestone, and Grassy Creek Shale), and Ordovician age rocks (consisting of Noix Limestone and St. Peter Sandstone).

Outcroppings of the Pennsylvanian-Marmaton Group rocks (cyclic deposits of brown, sandy limestone interbedded with shale and sandstone) are exposed near the eastern edge of the cattle pond located northeast of the left abutment (see Photo 10). The brown, slightly weathered, sandy limestone is horizontally bedded with horizontal fractures. The predominent bedrock in the site vicinity underlying the glacial-fluvial deposits is the Pennsylvanian-Marmaton Group rock. Inlet and outlet areas of the unnamed tributary of Davis Creek contains Quaternary alluvium.

No faults have been identified in the vicinity of the damsite. The closest trace of a fault to the damsite is the Kingdom City fault nearly 16 miles south of the damsite. The Kingdom City fault had its last movement in post-Ordovician time. Thus, the fault has no effect on the damsite.

Deimeke Lake Dam is a zoned, earthfill embankment. A principal spillway is located near the mid-section of the embankment and an emergency spillway is located at the left abutment.

No boring logs or construction reports were available that would indicate foundation conditions encountered during construction. Based on the visual inspections, Soil Conservation Service drawings, and conversations with Mr. Kenneth Deimeke, the embankment rests on glacial-fluvial deposits (grayish brown silty clay with shale fragments) with a core trench excavated into the glacial-fluvial deposits. The principal spillway pipe rests on compacted embankment fill (grayish brown, silty clay with shale fragments). The emergency spillway was cut into the glacial-fluvial deposits of the left abutment.

(2) Project Soils

According to the "Missouri General Soil Map and Soil Association Descriptions", published by the Soil Conservation Service, the materials in the general area of the dam belong to the soil series of Mexico-Leonard-Armstrong-Lindley in the Central Claypan Area. The soils were basically formed from loess and glacial till. The permeability of these soils ranges from slow to very slow. Based on 1) discussions with the owner and 2) a visual reconnaissance of the reservoir area, the Lindley soil type was apparently used to construct the embankment. This soil type is susceptible to erosion. Overtopping of the dam would increase the potential for failure due to erosion of the dam.

Materials were removed from both slopes in several locations. Samples were removed from the embankment at approximately 12 inches below the vegetative cover. The materials removed from the embankment generally appeared to be a grayish-brown, moderately plastic, silty clay with shale and shaley siltstone fragments. Based upon the Unified Soil Classification System, the soil would probably be classified as a CL. This soil type generally has the following characteristics: semi-pervious to impervious with a coefficient of permeability less than 100 feet per year, medium to high shear strength, and a low to intermediate resistance to piping.

d. Appurtenant Structures

(1) Principal Spillway

No major problems with the spillway were apparent. No seepage was observed in or around the pipe. Some minor surface rusting was observed. The pipe was not obstructed and appeared to be able to function as intended. The anti-vortex plate, which was to be provided, was not found; but it did appear that the plate was at one time bolted to the top of the pipe. The edge of the discharge pool at the end of the pipe has undergone some erosion due to

livestock activity (see Photo 6). Nevertheless, this does not appear to be a problem due to the fact that the edge of the pool is not very high and if erosion continues, it will tend to flatten out the edges of the pool.

(2) Emergency Spillway

The spillway is covered by an adequate cover of vegetation, except where the access road across the dam passes through the spillway (see Photo 7). No major problems with the spillway were found. No erosion or instabilities were apparent. The spillway was unobstructed and appeared to be capable of functioning properly. Some shrinkage cracks were observed in the channel measuring up to 1/2 of an inch wide, 8 inches deep, and 3 feet long; however, they did not appear to pose any danger to the spillway.

(3) Outlet Works

There are no low level outlets or outlet works provided for this dam; however, a portable, diesel-powered, centrifugal pump is used at the damsite. Reportedly, the pump is operable and can be used to drain the reservoir if needed.

e. Reservoir Area

The reservoir water surface elevation at the time of inspection was 766 feet above M.S.L.

The surface area of the reservoir at normal water level is about 7.4 acres. The rim appears to be stable with no signs of instability observed. Aside from the trees clustered at the rear of the reservoir and the few livestock and storage structures on the right side of the rim, the majority of the rim area is uncultivated land. The shore line is densely vegetated with thick, leafy plants. There are no houses built in close proximity to the reservoir.

f. Downstream Channel

The downstream channel, which carries flows from the principal and the emergency spillways, is a narrow, meandering, well-defined channel (see Photo 9). The channel is approximately 5 feet wide 2-1/2 feet deep, and has side slopes of 2V on 1H. In some areas, the sides of the channel were eroded. After crossing the roadway downstream of the dam the channel widens into a fairly wide channel. Growth of vegetation and trees has created an obstruction in the downstream channel. These obstructions will reduce the hydraulic efficiency of the channel.

3.2 Evaluation

The visual inspection did not exhibit any items that are sufficiently significant to indicate a need for immediate remedial action. However, the following problems were observed that could adversely affect the dam in the future.

1. The damage due to the grazing livestock and the lack of an adequate grass protection against surface runoff on the downstream slope does not adversely affect the stability of the dam in its present condition. However, further damage to the slope due to the grazing livestock and possible future surface erosion can have an adverse effect on the dam.

2. The erosion of the upstream slope due to wave action does not appear to affect the structural stability of the dam in its present condition.

3. Lack of erosion protection on the top of dam could pose a potential danger to the safety of the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

Deimeke Lake Dam is used to impound water from rainfall and runoff for crop irrigation. There are no specific procedures that are followed for the operation of the dam. The water level in the reservoir is controlled by rainfall, runoff, evaporation, the elevation of the crest of the principal spillway, and the rate at which the stored water is used for irrigation.

4.2 Maintenance of Dam

The dam is maintained by Mr. Kenneth Deimeke. The upstream slope and the top of dam are mowed periodically. Mr. Deimeke mentioned that cattle are allowed to graze on the downstream slope which is evident by the damage to the slope. The top of dam and upstream slope are protected from the grazing cattle by a barbed wire fence. There is no specific schedule or procedure for maintenance of the dam. The top of dam is also used as a farm access road.

4.3 Maintenance of Operating Facilities

The only operable facility at the damsite is the diesel powered irrigation pump. The pump is portable and is located on the north side of the reservoir. According to Mr. Deimeke, the pump is in good condition and operable.

4.4 Description of Any Warning System in Effect

The inspection team is not aware of any warning system in effect at the damsite.

4.5 Evaluation

The maintenance at Deimeke Lake Dam appears to be adequate, however, the remedial measures described in Section 7 should be undertaken to improve the condition of the dam.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

Some hydrologic and hydraulic design data for Deimeke Lake Dam were available from the Soil Conservation Service (SCS) and are included in this report as Plates 4 through Plate 7, and pages B-10 and B-11 in Appendix B. The sizes of physical features utilized to develop the stage-outflow relation for the spillway and overtopping of the dam were prepared from field notes and sketches prepared during the field inspection and the SCS design data. The reservoir elevation-capacity data were also taken from the SCS design data and were extended by using the U.S.G.S. Mexico West, Missouri Quadrangle topographic map (7.5 minute series). The spillway and overtop release rates and the reservoir elevation capacity data are presented in Appendix B.

The hydrologic soil group of the watershed was determined from information available in the U.S.D.A. Soil Conservation Service publication "Missouri General Soil Map and Soil Association Descriptions," 1979. The Probable Maximum Precipitation (PMP) used to determine the Probable Maximum Flood (PMF) was determined by using the U.S. Weather Bureau publication, "Hydrometeorological Report No. 33" (April, 1956). The 100-year flood was determined from 100-year, 24-hour rainfall of Moberly, Missouri.

b. Experience Data

It is believed that records of reservoir stage or spillway discharge are not maintained for this site. However, according to the Mr. Kenneth Deimeke, the maximum reservoir level was approximately 2 feet below the crest of the dam.

c. Visual Observations

Observations made of the spillways during the visual inspection are discussed in Section 3.1d and evaluated in Section 3.2.

d. Overtopping Potential

Both the Probable Maximum Flood and one-half of the Probable Maximum Flood, when routed through the reservoir, resulted in overtopping of the dam. The peak inflows of the PMF and one-half of the PMF are 2,483 cfs and 1,242 cfs, respectively. The peak outflow discharges for the PMF and one-half of the PMF are 2,204 and 983 cfs, respectively. The maximum capacity of the spillways just before overtopping the dam is 326 cfs. The PMF overtopped the dam by 1.26 feet and one-half of the PMF overtopped the dam by 0.63 feet. The total duration of flow over the dam is 5 hours during the PMF and 1 hour during one-half of the PMF. The spillway/reservoir system of Deimeke Lake Dam is capable of accommodating a flood equal to approximately 20 percent of the PMF just before overtopping the dam. The reservoir/spillway system of Deimeke Lake Dam will accommodate the one-percent chance flood without overtopping.

The maximum velocity of flow in the emergency spillway during PMF will be about 7.5 ft/sec. The emergency spillway channel may be subject to erosion due to high velocity of flow during the PMF. The dam may also be susceptible to erosion due to high velocity of flow on its downstream slope during overtopping of the dam.

The failure of the dam could cause extensive damage to the property downstream of the dam and possible loss of life. The estimated damage zone extends approximately one mile downstream of the dam. There are two dwellings and one trailer within the damage zone.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Other than the apparent dish-shaped depression on the downstream slope over the spillway pipe, there were no signs of settlement observed on the embankment or foundation during the visual inspection. There were no signs of distress on the embankment other than the scalloping on the upstream face. The top of dam and larger part of the downstream face are covered with sparse grass cover. No riprap protection has been provided on the upstream slope and, consequently, the slope has undergone some wave erosion; however, the slope is adequately protected by vegetation against surface erosion. In the absence of seepage and stability analyses, no quantitative evaluation of the structural stability can be made.

The spillways appeared to be structurally stable on the day of the inspection and capable of functioning properly.

b. Design and Construction Data

Some design drawings and hydrologic and hydraulic analyses from the project records were made available and these are included in the report. The design drawings presented in this report were of limited use in assessing the structural stability of the dam and appurtenant structures. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available. Embankment and foundation soil parameters, construction test result data, and specifications relating to the degree of embankment compaction were not available for use in a stability analysis.

c. Operating Records

No operating records were available relating to the dam or appurtenant structures. The water level on the day of the visual inspection was 7 feet below the top of dam. The normal operating level of the reservoir is assumed to be at the crest of the principal spillway. The highest water level in the reservoir was approximately two feet below the top of dam, according to Mr. Kenneth Deimeke.

d. Post Construction Changes

No post-construction changes to the embankment have been made, according to Mr. Deimeke.

e. Seismic Stability

The dam is located in Seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams" prepared by the Corps of Engineers, and will not require a seismic stability analysis. An earthquake of the magnitude that would be expected in Seismic Zone 1 will not cause distress to a well-designed and constructed earth dam. Available literature indicates that no active faults exist near the vicinity of the damsite.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

It should be realized that the reported condition of the dam is based upon observations of field conditions at the time of inspection along with data available to the inspection team.

It is also important to note that the condition of a dam depends upon numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be assurance that an unsafe condition could be detected.

a. Safety

The spillway capacity of Deimeke Lake Dam is found to be "Seriously Inadequate". The spillway/reservoir system will accommodate approximately 20 percent of the PMF without overtopping the dam. The surface soil in the embankment and the emergency spillway appears to be silty clay. The emergency spillway and the dam embankment have a cover of grass. The dam is overtopped by 1.26 feet during the occurrence of the PMF. The maximum velocity of flow in the emergency spillway during PMF will be about 7.5 ft/sec. The emergency spillway channel may be subject to erosion due to high

velocity of flow during the PMF. The dam may also be susceptible to erosion due to high velocity of flow on its downstream slope, during overtopping of the dam.

The dam appears to be in generally good condition. However, a quantitative evaluation of the safety of the embankment could not be made in view of the absence of seepage and stability analyses. The present embankment and appurtenant structures, however, reportedly have performed satisfactorily since their construction; there have been no failures or evidence of instability. Reportedly, the dam has never been overtopped and no evidence indicating the contrary was observed. The safety of the dam can be improved if the deficiencies described in Sections 3.2 and 6.1a are properly corrected as described in Section 7.2.

b. Adequacy of Information

The conclusions presented in this report are based upon field mesurement, past performance, and the present condition of the dam and available design drawings. Some information on the design hydrology and hydraulic design of the dam was available. Some of the hydrologic and hydraulic data from this information were considered valid and were used for Phase I hydrologic and hydraulic evaluation of the dam. From field measurements, the dam appeared to be constructed in accordance with the design drawings with only a few discrepancies observed. However, the drawings were of limited use in assessing the overall safety of the dam. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. Urgency

The remedial measures recommended in Paragraph 7.2 should be accomplished within a reasonable period of time, and the item recommended in paragraph 7.2a should be pursued on a high priority basis.

d. Necessity for Phase II Inspection

Based upon results of the Phase I inspection, a Phase II inspection is not felt to be necessary.

7.2 Remedial Measures

a. Alternatives

One of the following mitigation measures should be taken to avoid severe consequences of dam failure from overtopping.

1. Increase spillway capacity to pass the Probable Maximum Flood without overtopping the dam.

2. Increase the height of the dam enough to pass the PMF without overtopping the dam; an investigation also should be done that includes studying the effects on the structural stability of the existing embankment. The overtopping depth during the occurrence of the PMF, stated in Section 5.1d, is not the required or recommended increase in the height of the dam.

3. A combination of 1 and 2 above.

4. Provide a highly reliable flood warning system (generally does not prevent damage but avoids loss of life).

b. O & M Procedures

The following remedial measures should be undertaken to improve the condition of the dam.

1. Damage to the downstream slope due to grazing livestock should be properly repaired and an adequate protective cover provided on the entire slope to prevent surface erosion. The grazing livestock should be prevented access to the embankment. The vegetation on the slopes should be mowed periodically and large vegetation, such as bushes and trees, should be prevented from growing on the slope.

2. The wave erosion on the upstream slope should be properly repaired and the slope protected from further damage due to wave action.

3. An adequate surfacing should be placed on the top of dam to protect it from possible damage due to vehicular traffic or surface runoff erosion.

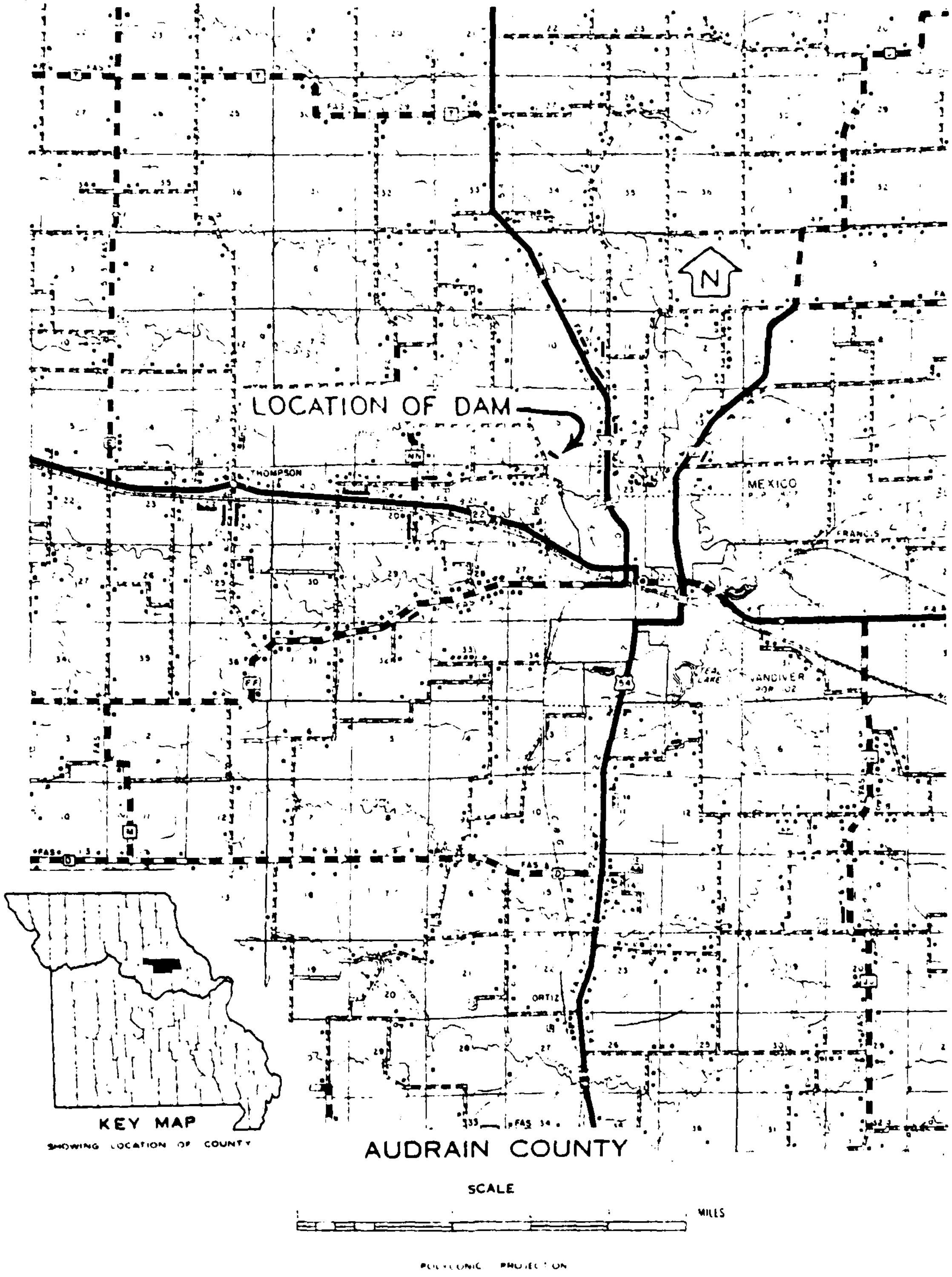
4. Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of earth dams.

5. The owner should initiate the following programs:

    (a) Periodic inspection of the dam by a professional engineer experienced in the design and construction of earthen dams.

    (b) Set up a maintenance schedule and log all visits to the dam for operation, repairs, and maintenance.

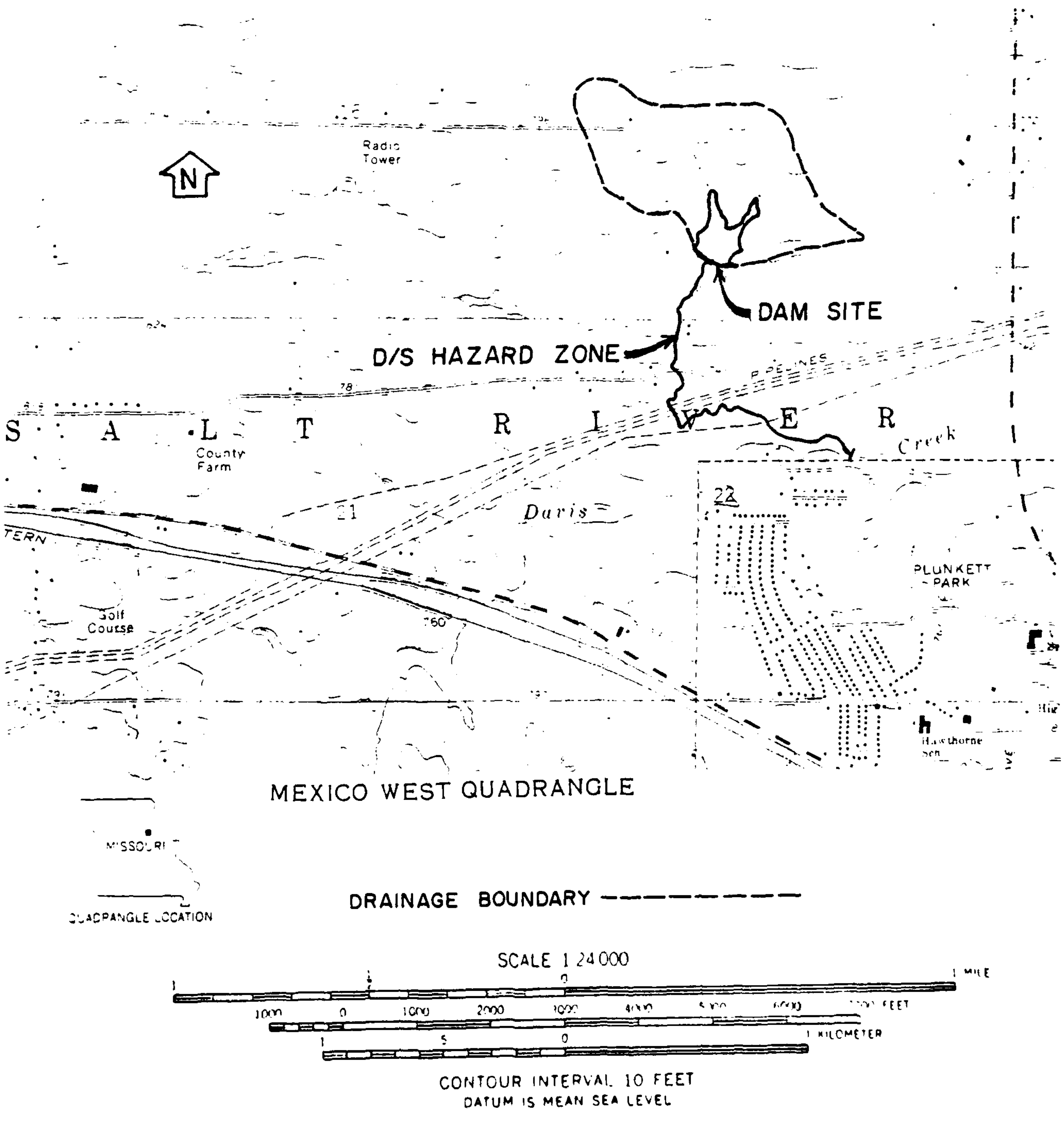
PLATES



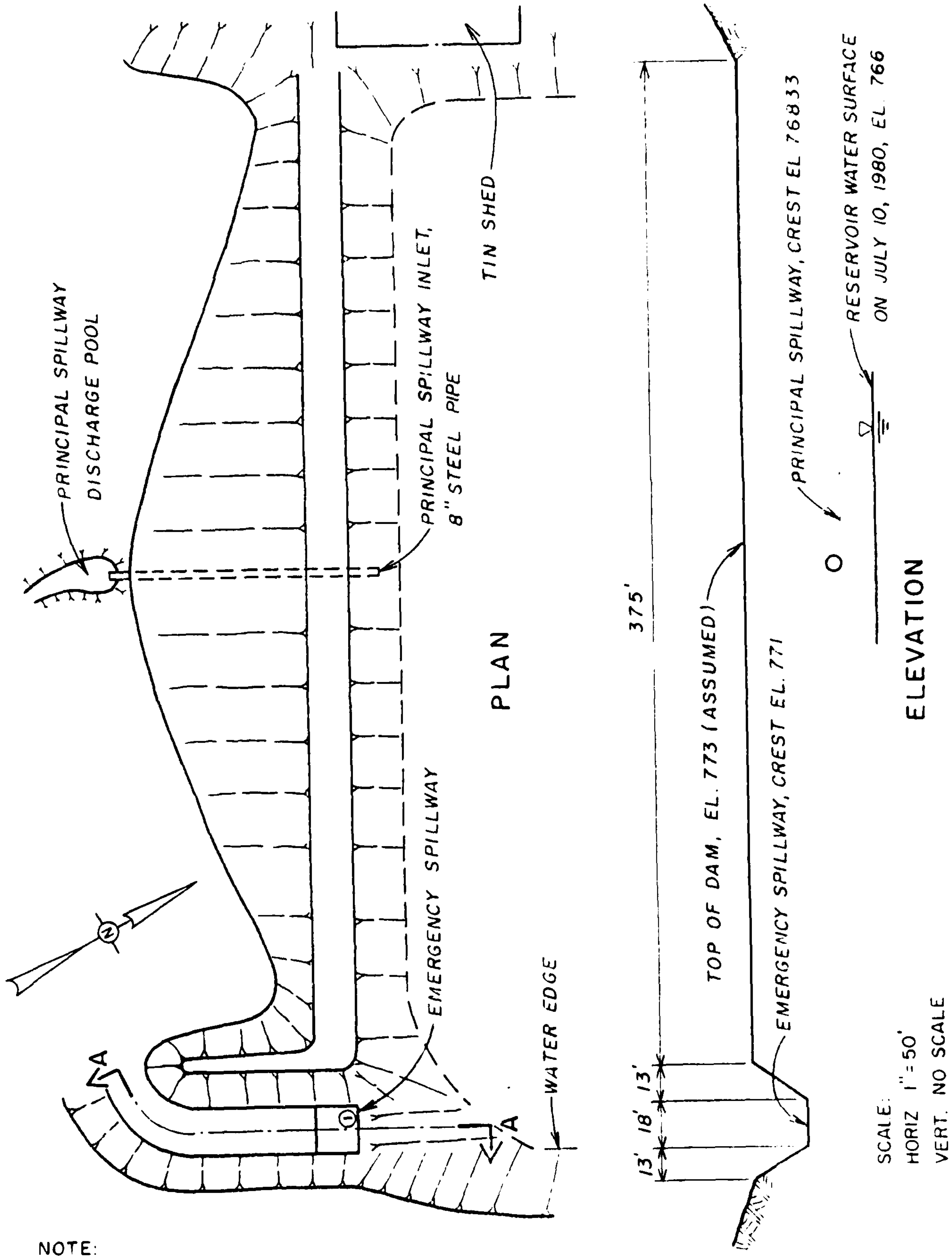
LOCATION MAP – DEIMEKE LAKE DAM

MO-11163

PLATE 1A

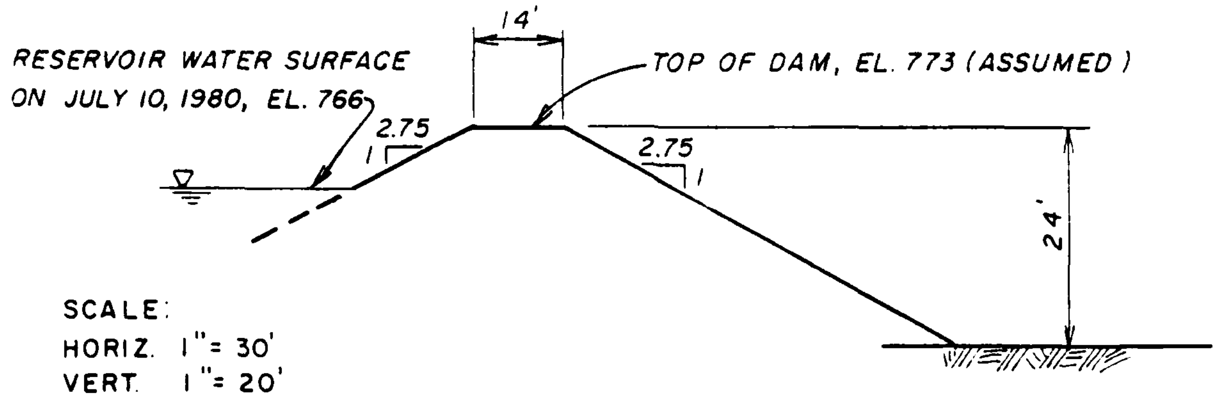


DEIMEKE LAKE DAM (MO. 11163)
DRAINAGE BASIN AND
DOWNSTREAM HAZARD ZONE



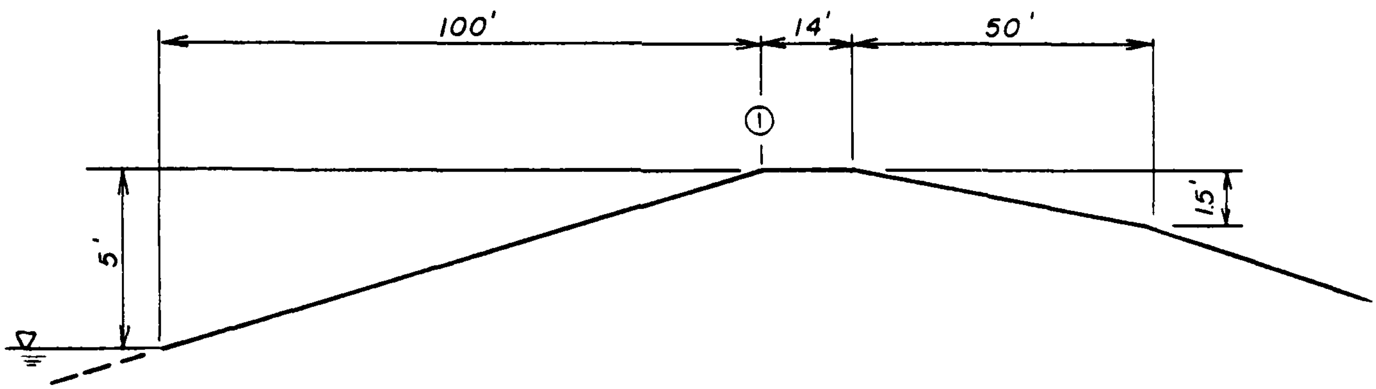
NOTE:
ALL ELEVATIONS ARE SHOWN AS FEET ABOVE M.S.L.

DEIMEKE LAKE DAM (MO. 11163)
PLAN AND ELEVATION



SCALE:
HORIZ. 1" = 30'
VERT. 1" = 20'

MAXIMUM SECTION



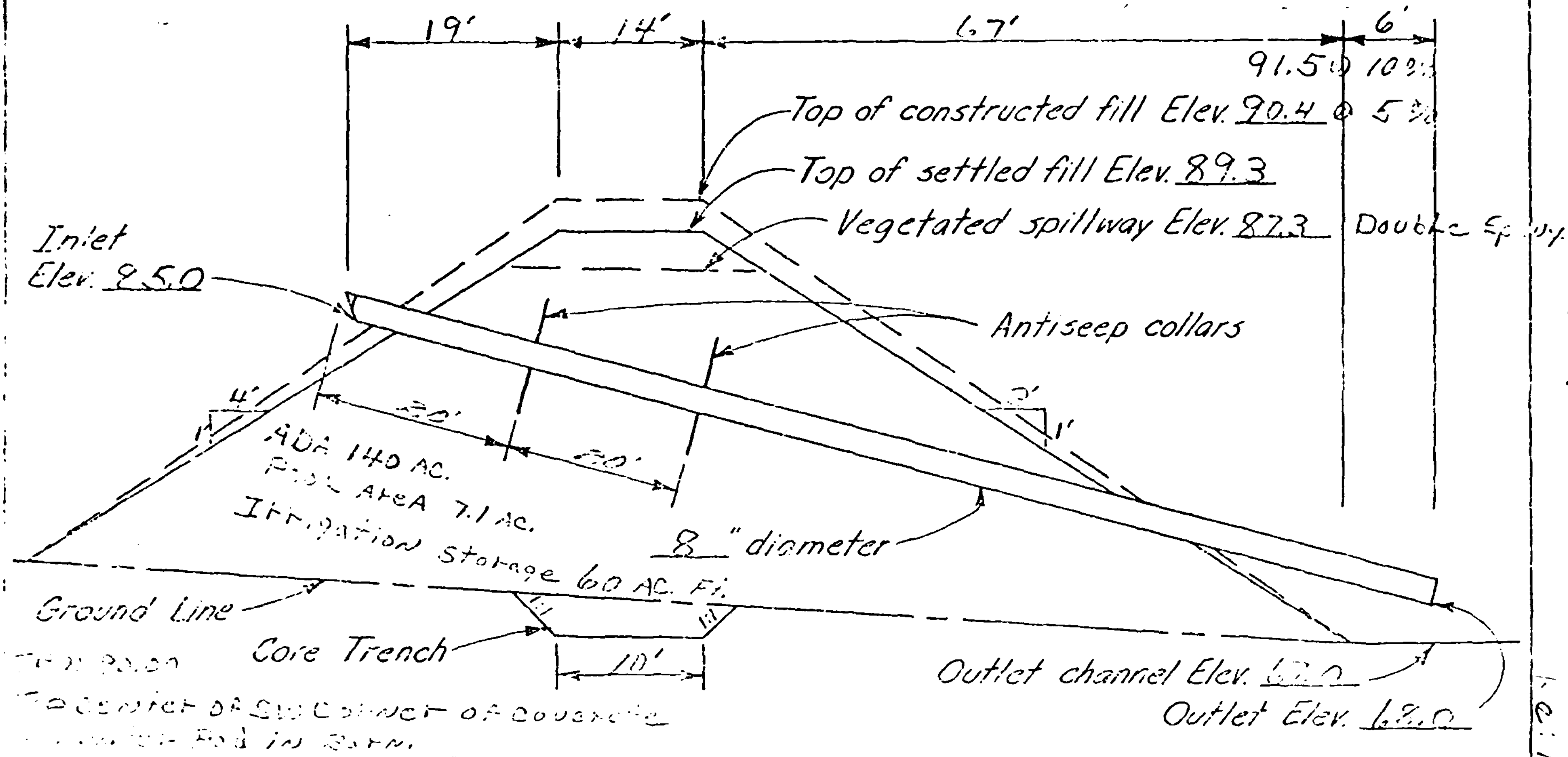
SCALE:
HORIZ. 1" = 30'
VERT. 1" = 5'

SECTION A-A
(EMERGENCY SPILLWAY PROFILE)

DEIMEKE LAKE DAM (MO. 11163)
MAXIMUM SECTION OF EMBANKMENT
AND EMERGENCY SPILLWAY PROFILE

MO-ENG 6 Rev. 9/75 File Code: Cooperator's Folder

PLATE 4



SECTION ALONG ℄ PRINCIPAL SPILLWAY

Not to Scale

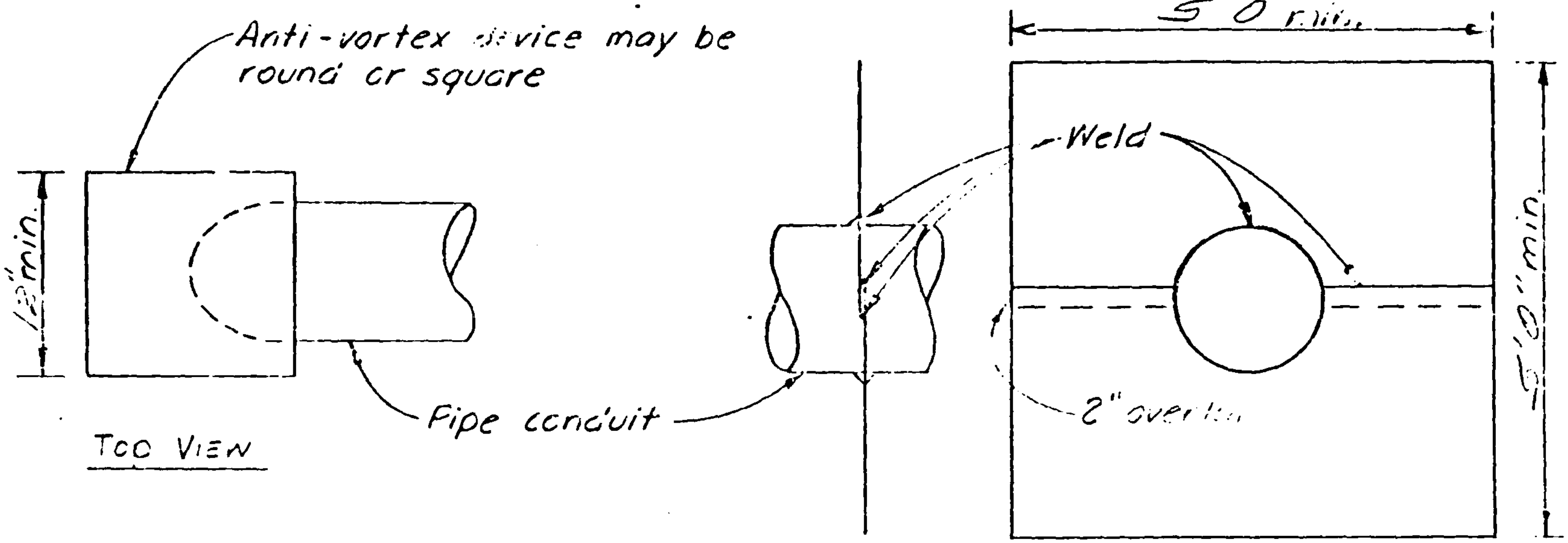
ESTIMATED QUANTITIES

QUAN.	UNIT	ITEM
[illegible]	Ft.	8" Welded Steel Pipe
[illegible]	[illegible]	[illegible] Collars
1	[illegible]	[illegible] Valves
[illegible]	Cu. Yd.	Earth Work

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

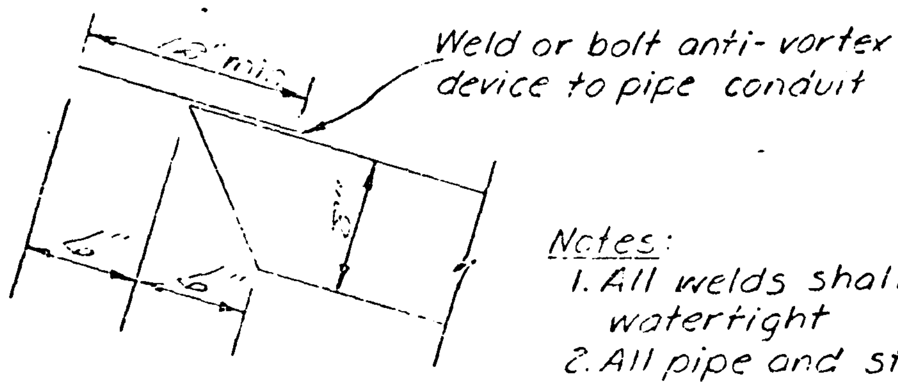
HOOD or CANOPY
INLET SPILLWAY

Landowner [illegible]
[illegible] County, Missouri
Designed by D. [illegible] Date 10-13-76
Checked by [illegible] Date [illegible]
Approved by [illegible] Date [illegible]
Sheet 1 of [illegible]



TOP VIEW

ANTI-SEEP COLLAR



SECTION ALONG ℄ OF INLET

HALF SECTION

Notes:

1. All welds shall be watertight
2. All pipe and steel plates shall have minimum thickness of 3/16"

Not to Scale

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
DETAILS OF WELDED STEEL PIPE HOOD INLET SPILLWAY	
Landowner	
County, Missouri	
Designed by	Date
Checked by	Date
Approved by	Date
Sheet of	

PLATE 6

MO-ENG-40
Rev. 6/73
File Code: ENG-13

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGN SHEET FOR CLASS II, III, IV * DETENTION STORAGE STRUCTURE
WITH DROP INLET SPILLWAY -- HOOD INLET SPILLWAY -- CANOPY INLET SPILLWAY *

Landowner ______________ County ______________

Design by ______________ Date ______________ Checked by ______________ Date ______________

Drainage area = ______ ac. Height x storage = ______ x ______ = ______

WATERSHED CONDITIONS AND FACTORS

Location factor: L = ______

Infiltration factor: (above) (average) (below) * I = ______

Topographic factor: ______% average slope T = ______

Shape factor: runoff distance = ______ ft. S = ______

Cover factor: cropland ______%, pasture ______%, timber ______% V = ______

Contouring factor: — C = —

Storage factor: —% terraced P = —

PEAK RATE OF RUNOFF AND VOLUME OF RUNOFF

Product of factors = L x I x T x S x V x C x P = ______ Q_{10} = ______ c.f.s.

V x I = ______ x ______ = ______

For Principal Spillway Design:

5 -year peak rate of runoff = Q_{ip} = ______ x ______ c.f.s. = ______ c.f.s.

Rate of volume of runoff = .14 ac. ft./ac. (Table 1, 1519)

Total volume of runoff = V_{rp} = (drainage area) x (rate of volume of runoff) x L =

140 ac. x ______ ac. ft./ac. x ______ = 19.6 ac. ft.

For Both Spillways (Total Structure):

______ -year peak rate of runoff = Q_i = ______ x ______ c.f.s. = ______ c.f.s.

Rate of volume of runoff = ______ ac. ft./ac.

Total volume of runoff = V_r = ______ ac. x ______ ac. ft./ac. x ______ = ______ ac.ft.

*Mark out those items that do not apply.

Instructions for use of form: Make one pencil copy for applicable structure. File with other worksheets and structure plan in landowner's folder in field office.

PRINCIPAL SPILLWAY DESIGN

Available storage at stage of ______ ft. = V_{sp} = ~~______ ac. ft.~~ (See map)

$V_{sp} \div V_{rp}$ = ~~______ ac. ft. ÷ ______ ac. ft. = ______. $Q_{op} \div Q_{ip}$ =~~ ______ (Table 2, 1519)

Q_{op} = ~~______ c.f.s. x ______ = ______ c.f.s.~~

Conduit: 100% Storage

Type______ Length = ______ ft. Total head on conduit = ______ ft.

Diameter = ~~______ in.~~ Discharge capacity = ______ c.f.s. (1520)

Minimum entrance head = ______ ft. (1510 or 1511)

Riser: **

Type______ Height = ______ ft. Diameter = ______ in. (1511)

EMERGENCY SPILLWAY DESIGN

Control Section:

Depth of flow = 1.0 ft. V_s at this depth = ______ ac. ft. (See map)

$V_s \div V_r$ = ______ ac. ft. ÷ ______ ac. ft. = ______ .75

$Q_{op} \div Q_i$ = ______ c.f.s. ÷ ______ c.f.s. = ______. $Q_{oe} \div Q_i$ = ______ (Table 3, 1519)

Q_{oe} = ______ c.f.s. x ______ = ______ c.f.s.

Width = 20 ft. Total depth = depth of flow + freeboard = ______ ft. + 1.0 =

2.0 ft. Use ______ ft. (Table 4, 1517)

Exit Section:

Slope = ______% Quality of vegetation: (fair) (good) (excellent) *

(Less) (More) * erosive soils. Permissible velocity = ______ f.p.s. (1517)

Depth = ______ ft. Design velocity = ______ f.p.s. Width = ______ ft. (1517 or 1505)

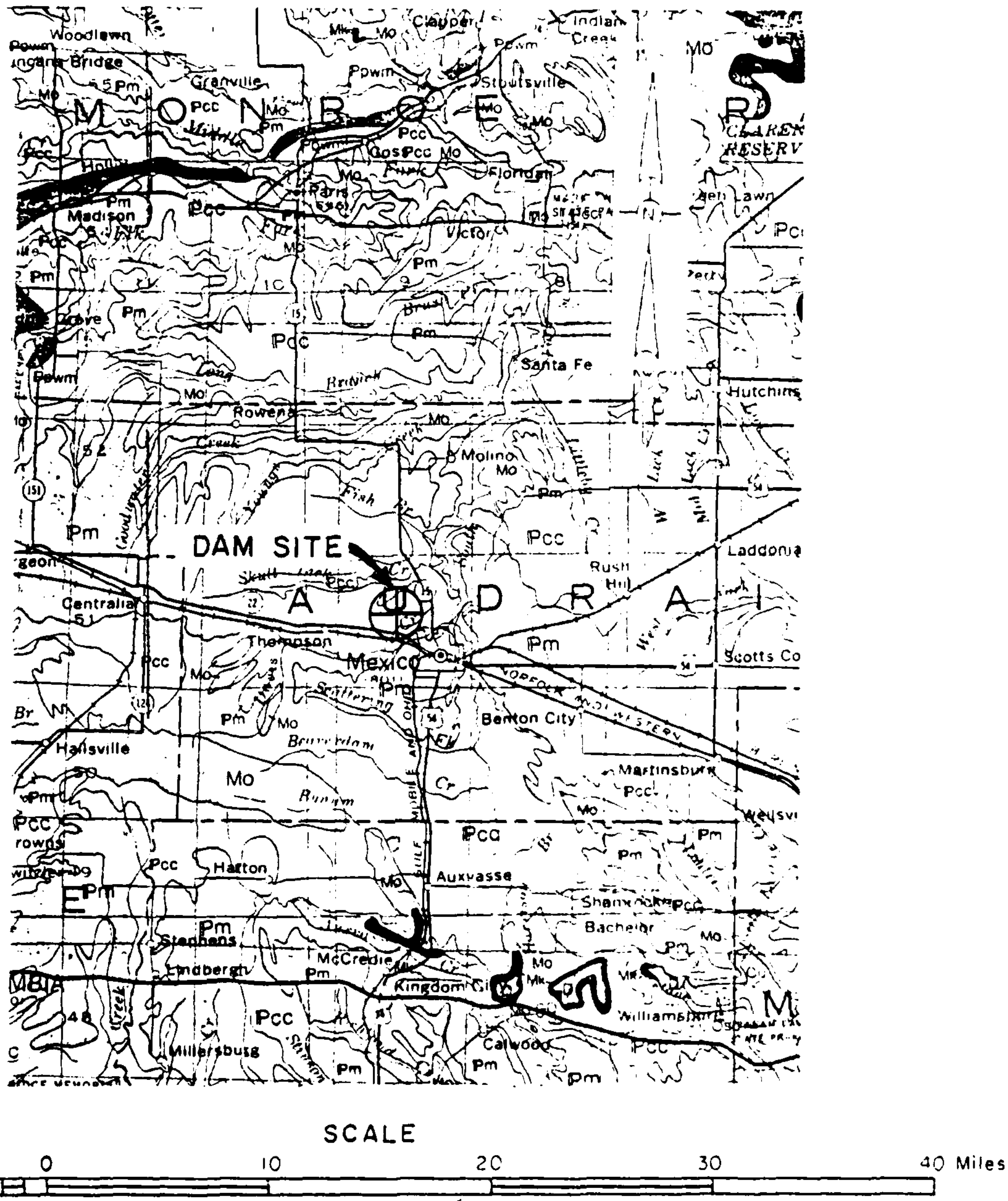
Use width of ______ ft.

ANTI-SEEP COLLARS

Length of saturated zone = L = ______ ft. Collar addition = ______ ft. (1515)

Number = n = (L x ______) ÷ V = (______ x ______) ÷ ______ = ______. Use______ collars.

* Mark out those items that do not apply.
** Applies only to Drop Inlet Spillways.



⊕ LOCATION OF DAM

NOTE: LEGEND OF THIS DAM IS ON PLATE 9

REFERENCE:

GEOLOGIC MAP OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI GEOLOGICAL SURVEY
KENNETH H. ANDERSON, 1979

REGIONAL GEOLOGICAL MAP OF DEIMEKE LAKE DAM

LEGEND

PERIOD	SYMBOL	DESCRIPTION
QUATERNARY	Qal	ALLUVIUM: SAND, SILT, GRAVEL
PENNSYLVANIAN	PPwm	PLEASANTON GROUP: CYCLIC DEPOSITS OF SANDSTONE SHALE AND LIMESTONE
	Pm	MARMATON GROUP: CYCLIC DEPOSITS OF SHALE, LIMESTONE AND SANDSTONE
	Pcc	CHEROKEE GROUP: CYCLIC DEPOSITS OF SHALE, LIMESTONE AND SANDSTONE
MISSISSIPPIAN	Mo	*KEOKUK - BURLINGTON FORMATION:* CHERTY GRAYISH BROWN SANDY LIMESTONE
	Mk	CHOUTEAU GROUP: COMPTON AND BACHELOR FORMATION (LIMESTONE AND SHALE)
DEVONIAN	D	SULPHUR SPRING GROUP: BUSHBERG SANDSTONE, GLEN PARK LIMESTONE, GRASSY CREEK SHALE
ORDOVICIAN	Ou	NOIX LIMESTONE
	Osp	ST. PETER SANDSTONE

APPENDIX A

PHOTOGRAPHS

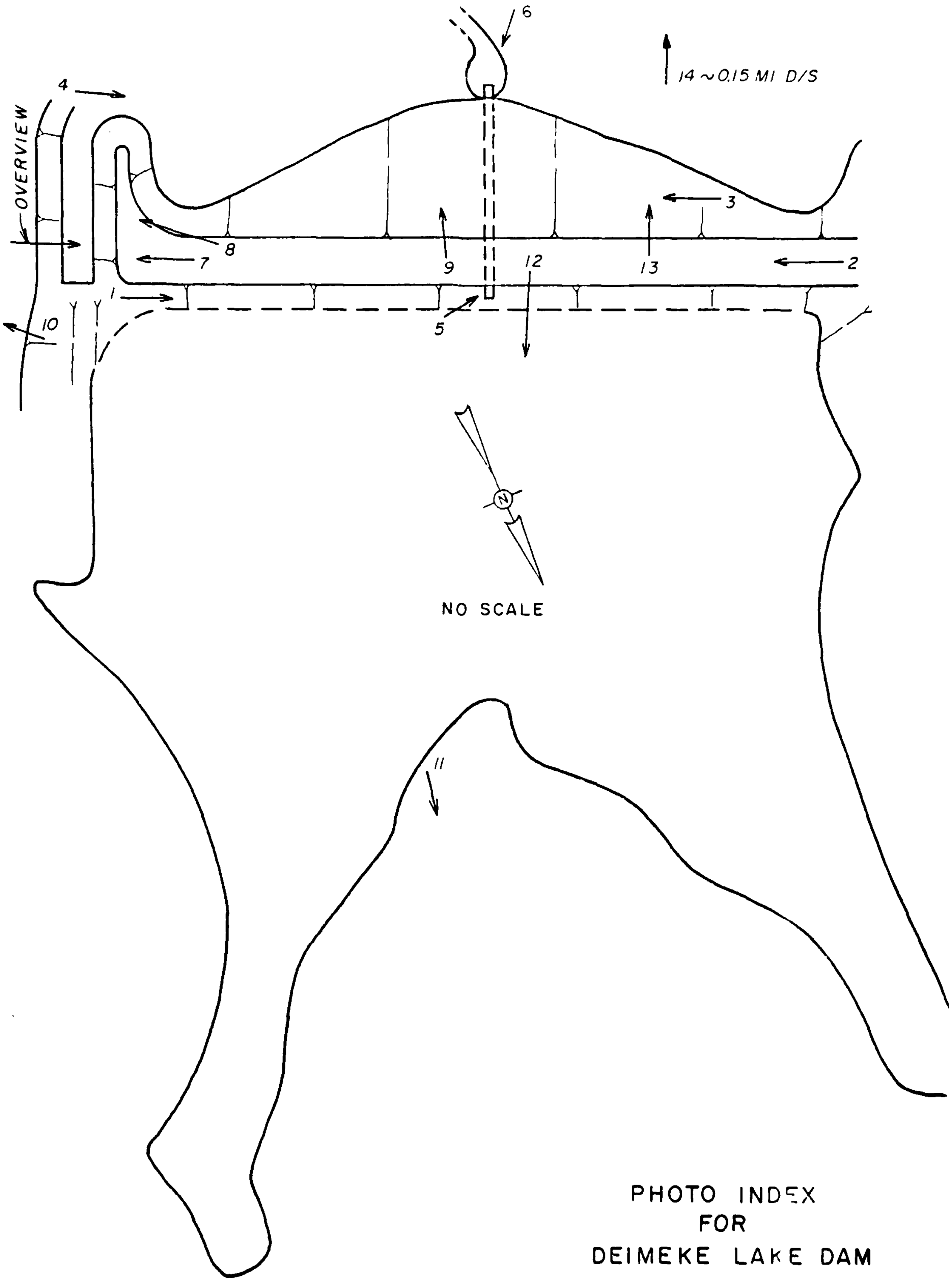


PHOTO INDEX
FOR
DEIMEKE LAKE DAM

Deimeke Lake Dam

Photographs

Photo 1 - View of the upstream slope showing the two different types of vegetation.

Photo 2 - View of the top of dam.

Photo 3 - View of the downstream slope showing damage to slope due to grazing cattle and a sparse grass cover.

Photo 4 - View of the left abutment area taken from the downstream end of the emergency spillway and showing the downstream slope of the embankment and the area where flows from the emergency spillway will flow down the left abutment area before meeting the downstream channel.

Photo 5 - View of the inlet to the principal spillway.

Photo 6 - View of the outlet of the principal spillway showing the discharge pool.

Photo 7 - View of the control section of the emergency spillway.

Photo 8 - View of the training berm of the emergency spillway that runs at a right angle to the dam embankment.

Photo 9 - View of the downstream channel.

Photo 10 - View of the sandy limestone outcrop that is interbedded with shale and sandstone located on the left abutment.

Photo 11 - View of portable centrifugal pump located on the north end of the reservoir.

Photo 12 - View of the reservoir and rim.

Photo 13 - View of the dwellings downstream of the dam that appear to be in the downstream hazard zone. The photo is taken from the dam embankment.

Photo 14 - Close-up view of the dwellings in photo 13.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

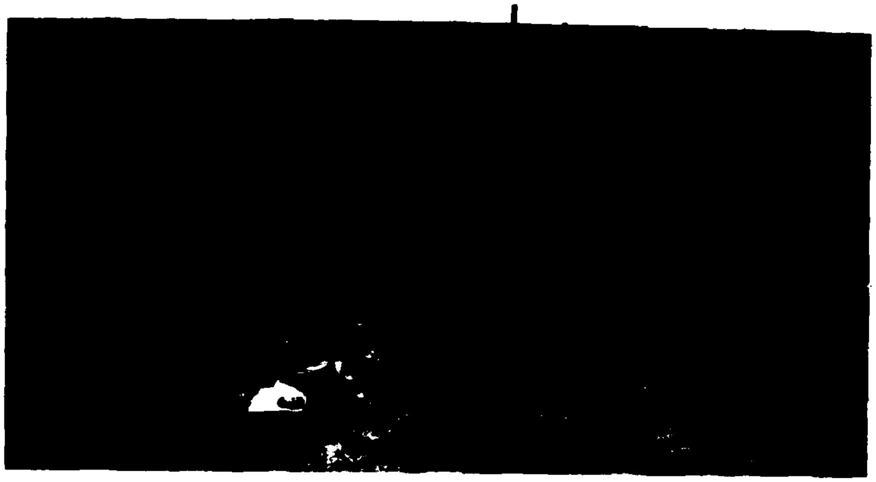


Photo 7

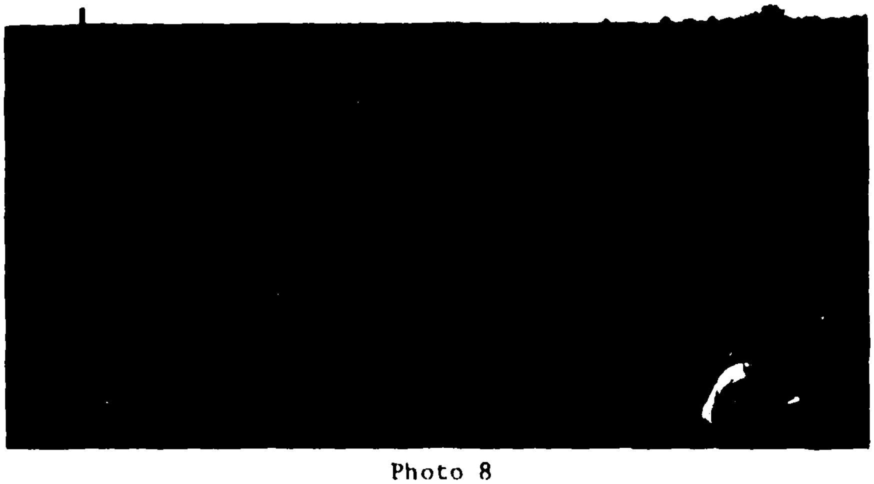


Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

APPENDIX B

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DEIMEKE LAKE DAM

HYDROLOGIC AND HYDRAULIC DATA, ASSUMPTIONS AND METHODOLOGY

1. SCS Unit Hydrograph and HEC-1DB are used to develop the inflow hydrographs, and the hydrologic inputs are as follows:

   (a) Twenty-four hour probable maximum precipitation from Hydrometeorological Report No. 33, 24-hour 100-year rainfall of Moberly, Missouri.

   (b) Drainage area = 133 acres

   (c) Lag time = 1.50 hours.

   (d) Hydrologic Soil Group:
   Soil Group "D"

   (e) Runoff curve number:
   CN = 79 for AMC II and CN = 91 for AMC III.

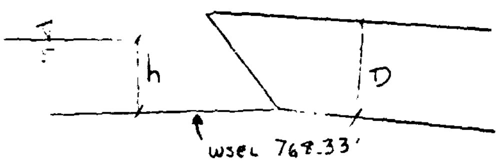
2. Spillway release rates are based on pipe flow assuming Manning's n = 0.011. Flow rates over the dam are based on broad crested weir equation $Q = CLH^{3/2}$.

3. Floods are routed through Deimeke Lake to determine the capability of its spillways.

DAM SAFETY INSPECTION - MISSOURI 1
DEIMEKE LAKE DAM 12,?
PRINCIPAL SPILLWAY RATING CURVE DC

Hooded pipe spillway

$n = .011$
$L = 107'$
$D = 8'' = .667'$



ASSUME CRITICAL DEPTH

h/D	WSEL	$*Q/D^{5/2}$	Q
0	768.33	0	0
.2	768.46	.16	.057
.4	768.60	.4[illegible]	.1?7
.6	768.73	.88	.319
.8	768.86	1.5[illegible]	.5[illegible]
1.0	769.00	[illegible]	.797
1.1	769.06	[illegible]	.907
1.2	769.13	[illegible]	1.016

① weir flow $\quad OC \ \frac{h}{D} = 1.1$

Between weir & full flow

$$\frac{h}{D} = 1.1 + .025\left(\frac{Q}{D^{5/2}} - 2.5\right)$$

"Hood Inlets for Culvert Spillways" Technical Release No. 3, Design Section, June 27, 1957 U.S. Dept. of Agriculture, SCS, Engineering Division (Equation 11-3)

With $D = .667'$

$$1.5h = 1.1 + .025\left(2.7557\,Q - 2.5\right)$$

$$Q = \left(\frac{1.5h - 1.1}{.025} + 2.5\right) \Big/ 2.7557$$

Pressure flow $\quad Q = A\sqrt{\dfrac{2gH}{1 + K_e + K_{pL}}}$

$$H = h + 15.5 - \frac{D}{2} = h + 15.167$$

$K_e = 1$ (entrance loss)

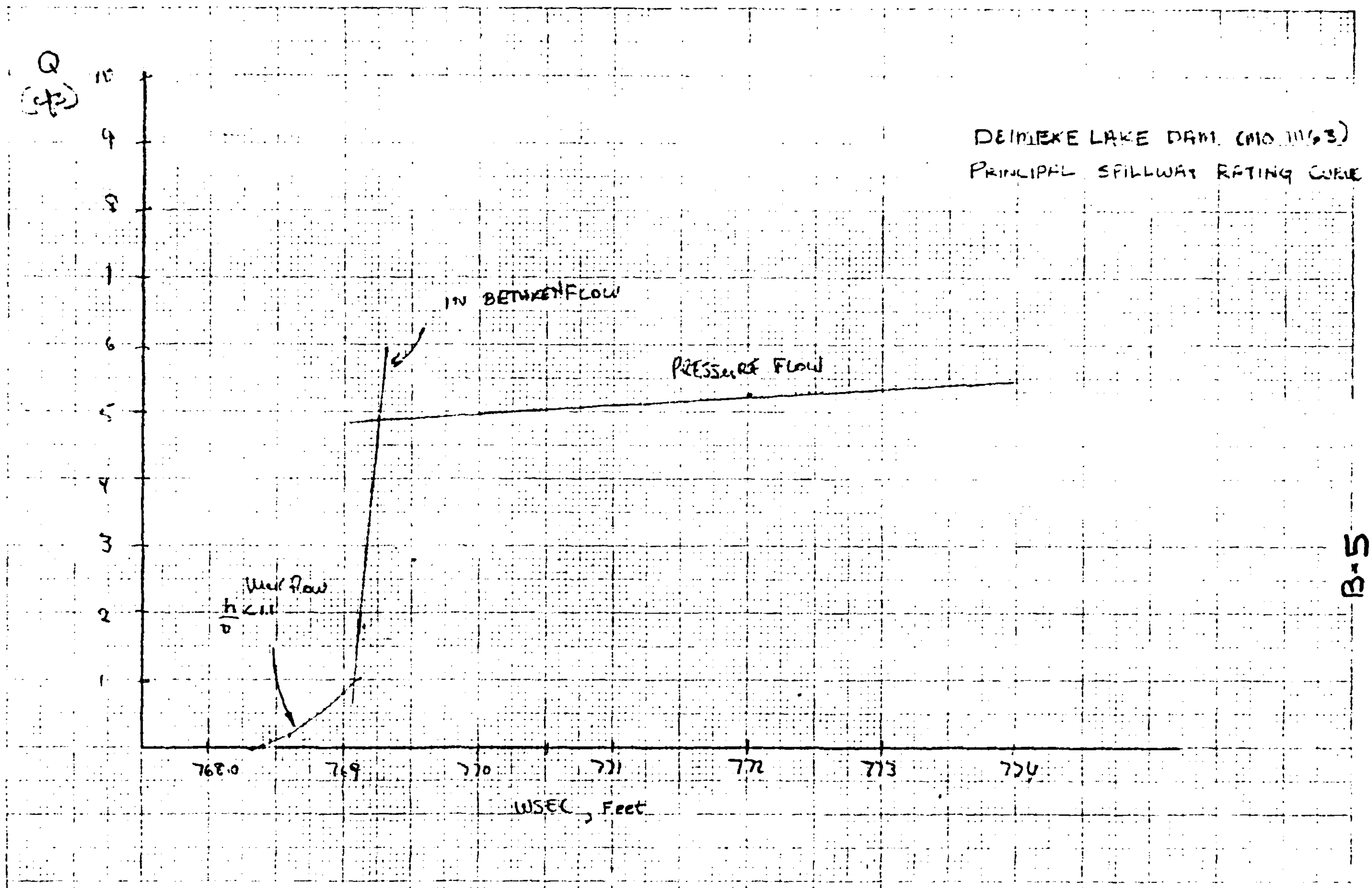
$$K_{pL} = \frac{5087 n^2 L}{d_i^{4/3}} = \frac{5087(.011)^2 L}{8^{4/3}} = .0385L \qquad A = .?$$

DAM SAFETY INSPECTION - MISSOURI [illegible] 2

[illegible] LAKE DAM [illegible]

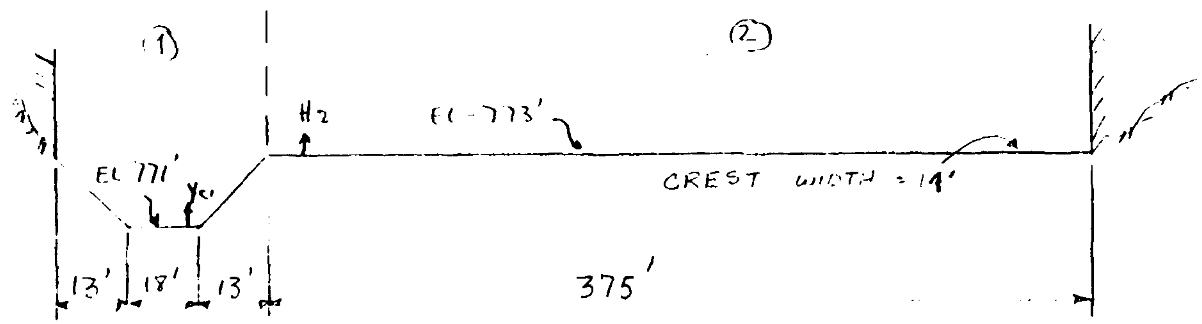
PRINCIPAL SPILLWAY RATING CURVE [illegible]

$$Q = .349 \left(\frac{64.4\,(H)}{1 + 1 + .0385\,(107)} \right)^{1/2} = 1.132\sqrt{H}$$



DEIMEKE LAKE DAM (MO 11163)
PRINCIPAL SPILLWAY RATING CURVE
Q
IN BETWEEN FLOW
PRESSURE FLOW
Weir Flow
768.0
769
770
771
772
773
774
WSEL, Feet

DAM SAFETY INSPECTION - MISSOURI 198?
DEIMEKE LAKE DAM (MO 11163)
EMERGENCY SPILLWAY AND OVERTOP RATING CURVE



y_{c_1}	A_{c_1}	T_{c_1}	$V_{c_1} = \sqrt{\frac{A_{c_1} g}{T_{c_1}}}$	$\frac{V_{c_1}^2}{2g}$	$Q_1 = V_{c_1} A_{c_1}$	W.S. ELEV. = $y_{c_1} + \frac{V_{c_1}^2}{2g} + 771$	C_2	H_2	L_2	$Q_2 = C_2 L_2 H_2^{3/2}$	$Q_T = Q_1 + Q_2$
0											
.3	5.99	21.9	2.97	.14	17.75	771.44					18
.7	15.79	27.1	4.33	.29	68.36	771.99					68
1.0	24.5	31.0	5.04	.40	123.57	772.40					124
1.3	34.37	34.9	5.63	.49	193.67	772.79					194
1.7	49.39	40.1	6.30	.62	310.99	773.32	2.99	.32	375'	203.14	514
2.0	62.0	44.0	6.73	.70	417.63	773.70	3.03	.70	375	665.37	1083
2.5	84.0	44.0	7.84	.95	658.60	774.45	3.04	1.45	375	1990.9	2650
3.0	106.0	44.0	8.81	1.20	933.60	775.20	3.05	2.2	375	3728.5	4662
4.0	150.0	44.0	10.48	1.70	1571.59	776.70	3.08	3.7	375	8228.3	9800

SECTION 1:

for $0 < y < 2'$, $T = 18 + 13y$
$A = y(T - 6.5y)$

for $2' \leq y$, $T = 44$
$A = Ty - 44$

DEIMEKE LAKE DAM (MO 11163)

CRITICAL DEPTH CHECK

$$S_c = \left(\frac{n V_c}{1.49 R_h^{2/3}}\right)^2$$

For $y_c = .3$

$$S_c = \left[\frac{.03(2.97)}{1.49\left(\frac{5.99}{21.9}\right)^{2/3}}\right]^2 = .02 < S_{bed} = \frac{1.5}{50} = .03 \quad \therefore \text{OK}$$

For $y_c = 3.0$

$$S_c = \left[\frac{.03(8.81)}{1.49\left(\frac{106}{44}\right)^{2/3}}\right]^2 = .0097 < S_{bed} = .03 \quad \therefore \text{OK}$$

Assumption of critical depth is correct

ECI-4 **PRC ENGINEERING CONSULTANTS, INC.**

DAM SAFETY INSPECTION / MISSOURI — SHEET NO. 5 OF ____

DELMERE LAKE DAM — JOB NO. 1263

COMBINED RATING CURVE — BY ____ DATE ____

Datum = 750.67

Reservoir Water Surface Elev.	H_T	Principal Spillway Discharge $Q = 11.32\sqrt{H_T}$	Emergency Spillway Discharge	Discharge Over Top of Dam	Combined Discharge
768.33	—	0 *	—	—	—
768.73	—	.31 *	—	—	0.3
769.2	—	3.81 *	—	—	4
769.5	18.83	4.91			5
771.44	20.73	5.15	17.75		23
771.99	21.32	5.23	68.36		73
772.40	21.73	5.28	123.59		129
772.79	22.12	5.32	193.67		199
773.32	22.65	5.39	310.99	203.14	519
773.7	23.03	5.43	417.63	665.37	1088
774.45	23.78	5.52	658.6	1990.7	2656
775.2	24.53	5.61	933.6	3728.5	4667
776.7	26.03	5.78	1571.6	8228.3	9806

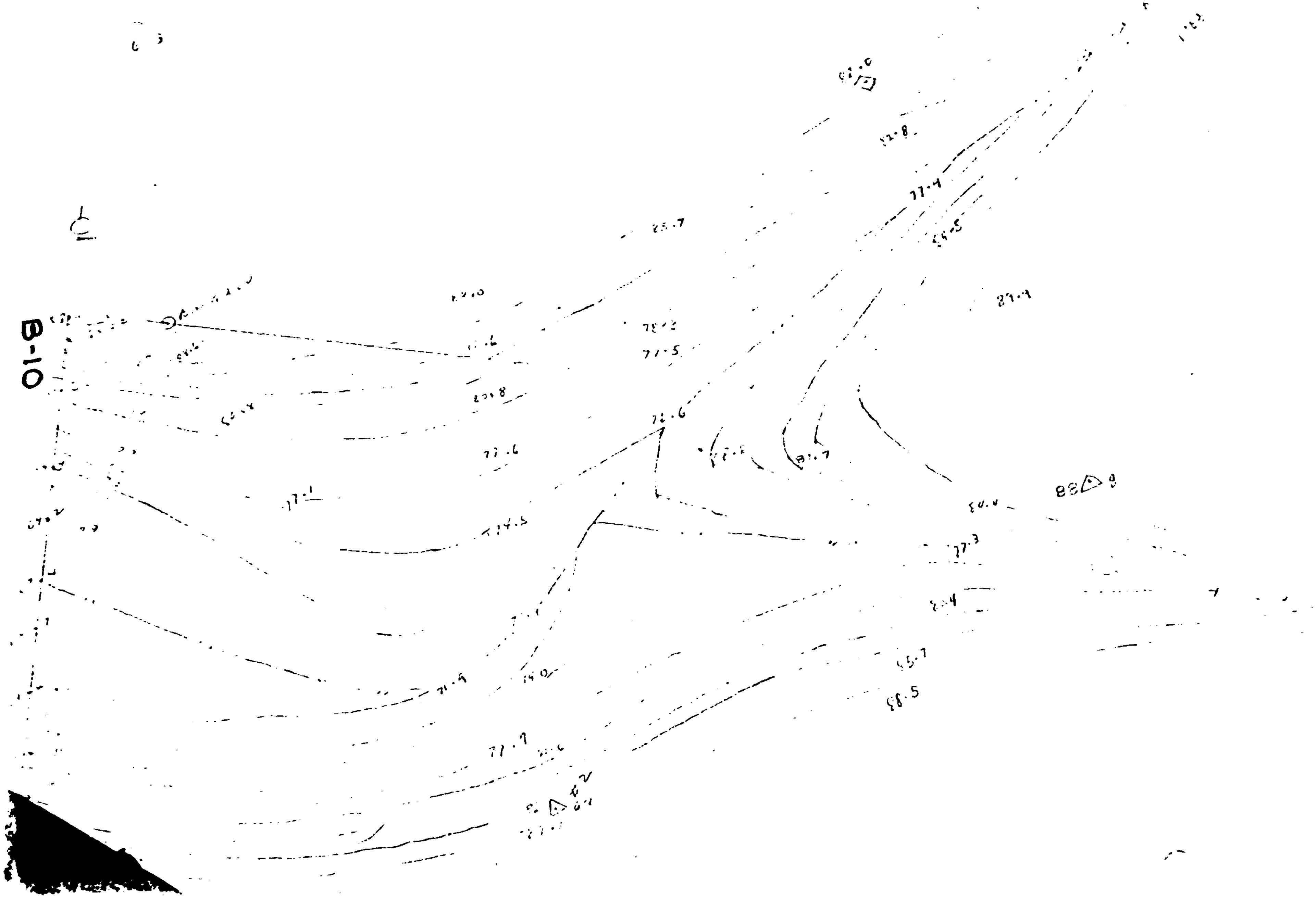
* Weir Flow

ECI-4 **PRC ENGINEERING CONSULTANTS, INC.**

DAM SAFETY INSPECTION - MISSOURI SHEET NO. [illegible] OF [illegible]
DAM NAME: DEIMEKE LAKE DAM / ID NO.: JOB NO. [illegible]
RESERVOIR ELEVATION - AREA DATA BY [illegible] DATE [illegible]

ELEV. (M.S.L.) (Ft.)	RESERVOIR SURFACE AREA (Acres)	Cumulative Storage (Ac - Ft)	REMARKS
750'	0	0	SCS Notes
752'	0.4	.4	"
754'	0.8	1.6	"
756	1.2	3.6	"
758	2.2	7.0	"
760	3.1	12.3	"
762	4.9	20.3	"
764	5.4	30.6	"
766	6.3	42.5	"
768	7.1	55.9	"
768.33	7.4	58.3	Principal Spillway
770	8.2	71.2	SCS Notes
771	8.7	79.7	Emergency Spillway
772	9.2	88.6	SCS Notes
773	11	98.7	Top of Dam
[illegible]	17.0	196.7	Measured on USGS Map

Kenmore & L...
Shirk & Engebret K-376
Scale 1" = 100'



IH Lake

[illegible]

[illegible] [illegible]

ELV	Sq in	Area
69	1.9	.4
71	3.4	.8
73	5.4	1.2
75	9.5	2.2
77	13.7	3.1
79	21.4	4.9
81	23.7	5.4
83	27.6	6.3
85	3[illegible].2	7.1
87	3[illegible]	8.2

Scale 1 sq in = 10000 sq ft

ELV.	Area	Stor.	Acc Stor	MSL
67	0	0	0	750
69	.4	.4	.4	752
71	[illegible]	1.2	1.6	754
[illegible]	[illegible]	2.0	3.6	756
[illegible]	[illegible]	3.4	7.0	758
[illegible]	3.1	5.3	12.3	760
79	4.9	8.0	20.3	762
81	5.4	10.3	30.6	764
83	6.3	11.9	42.5	766
85	7.1	13.4	55.9	768
87	8.2	15.3	71.2	770
89	[illegible]	17.4	[illegible]	772

The local SCS elevations were correlated with the M.S.L. elevations by comparing [illegible] [illegible] those determined from the U.S.G.S. map and by the elevations from the SCS plans.

ECI-4 PRC ENGINEERING CONSULTANTS, INC.

DAM SAFETY INSPECTION / MISSOURI SHEET NO. ___ OF ___

DAM NAME: Dzimek's Lake JOB NO. 1263

UNIT HYDROGRAPH PARAMETERS BY ___ DATE ___

1) DRAINAGE AREA, A = .207 sq. mi. = (133 acres)

2) LENGTH OF STREAM, L = (1.2 " x 2000 ' = 2400 ') = .455 mi.

3) ELEVATION AT DRAINAGE DIVIDE ALONG THE LONGEST STREAM,

$H_1 = 813$

4) ELEVATION OF RESERVOIR AT SPILLWAY CREST, $H_2 = 768.33'$

5) ELEVATION OF CHANNEL BED AT 0.85L, $E_{85} = 812'$

6) ELEVATION OF CHANNEL BED AT 0.10L, $E_{10} = 780'$

7) AVERAGE SLOPE OF THE CHANNEL, $S_{AVG} = (E_{85} - E_{10}) / 0.75L = 1.78\%$

8) TIME OF CONCENTRATION:

A) BY KIRPICH'S EQUATION,

$$t_c = [(11.9 \times L^3)/(H_1 - H_2)]^{0.385} = \left[\frac{11.9 \times .455^3}{813 - 768.33}\right]^{.385} = .24 \text{ hr}$$

B) BY VELOCITY ESTIMATE,

SLOPE = 1.78% $\Longrightarrow$ AVG. VELOCITY = 2 fps

$$t_c = L/V = 2400' / 60(60)(2) = 0.33 \text{ hr}$$

USE $t_c = .24$ hr

9) LAG TIME, $t_\ell = 0.6\, t_c = .15$

10) UNIT DURATION, $D \le t_\ell / 3 = .049$ hr < 0.083 hr.

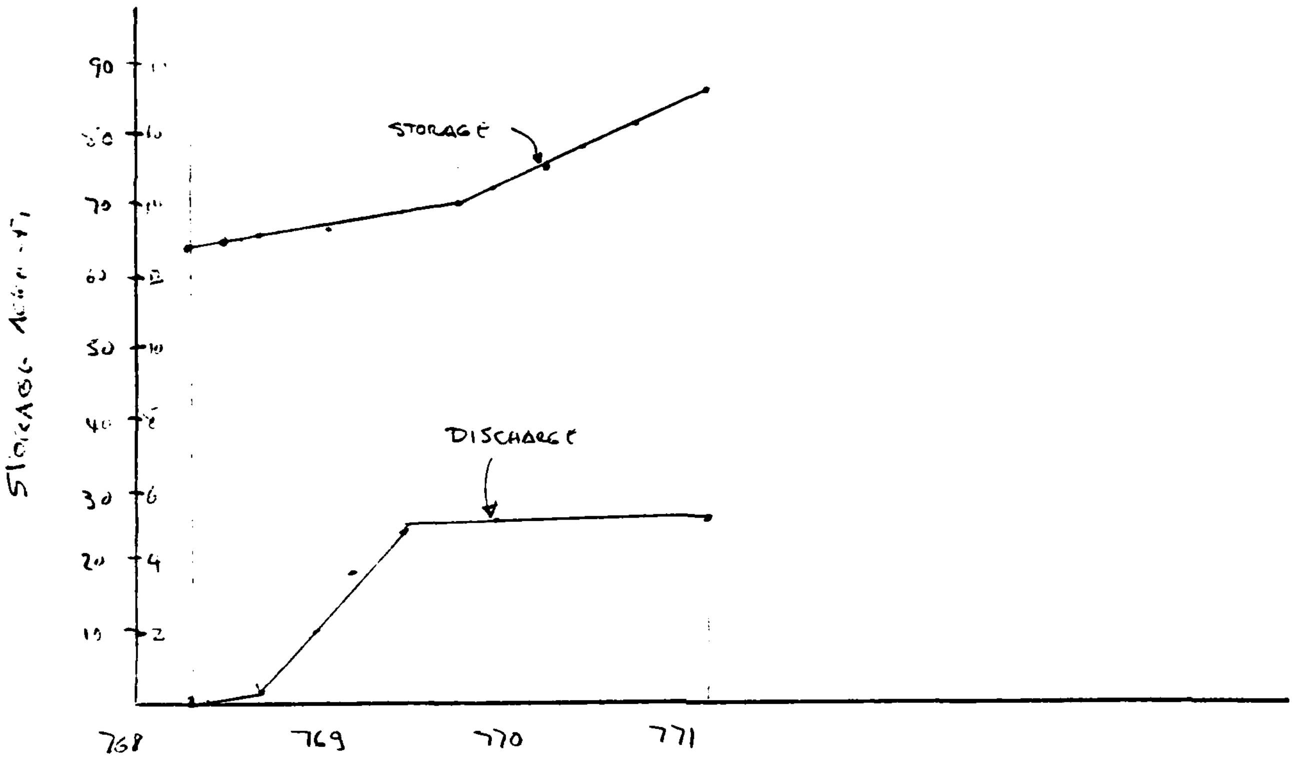
USE D = .083 hr

11) TIME TO PEAK, $T_p = D/2 + t_\ell = .19$ hr

12) PEAK DISCHARGE,

$$q_p = (484 \times A) / T_p = 527 \text{ cfs}$$

DEIMEKE LAKE DAM (MO 11153)
STARTING ELEVATION FOR PMF ROUTING



Elevation	Storage	Discharge	Δt	ΣΔt
771.2	.86	5.1	0	1
769.8	70	5.05	1.59	2.59
769.5	68	4.9	.2	2.79
768.33	64	0	.82	3.62 < 4 days

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************
   1         A1            DAM SAFETY INSPECTION_MISSOURI
   2         A2        DEIMEKE LAKE DAM (MO 11163)
   3         A3              PMF AND 50 PERCENT PMF
   4         B     300       0       5       0       0       0       0       0       0       0
   5         B1      5
   6         J       1       2       1
   7         J1      1      .5
   8         K       0 MO11163                                     1
   9         K1     INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS
  10         M       1       2    .207            .207       1
  11         P            24.5     100     120     130
  12         T                                                     -1     -91
  13         W2            .15
  14         X       0               1
  15         K       1 MO11163                                     1
  16         K1      ROUTE HYDROGRAPH THROUGH DEIMEKE LAKE DAM (MO 11163)
  17         Y                               1       1
  18         Y1                                               -768.33      -1
  19         Y4768.33  768.73   769.2   769.5  771.44  771.99   772.4  772.79  773.32   773.7
  20         Y4774.45   775.2   776.7
  21         Y5      0      .3       4       5      23      73     129     199     519    1088
  22         Y5   2556    4668    9836
  23         $S      0      .4     1.6     3.6       7    12.3    20.3    30.6    42.5    55.9
  24         $S [illegible]  71.2  79.7  89.6    98.7   196.7
  25         $E    750     752     754     756     758     760     762     764     766     768
  26         $E768.33     770     771     772     773     760
  27         $$768.33
  28         $D    773
  29         K      99
```

B-14

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE* 80/08/11.
     TIME* 09.18.04.


                   DAM SAFETY INSPECTION MISSOURI
                 GEINEKE LAKE DAM (MO 11163)
                          PMF AND 50 PERCENT PMF

                                   JOB SPECIFICATION
        NQ     NHR     NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
       300       0        5       0       0       0       0       0       0       0
                                  JOPER     NWT   LROPT   TRACE
                                      5       0       0       0

                       MULTI-PLAN ANALYSES TO BE PERFORMED
                          NPLAN= 1 NRTIO= 2 LRTIO= 1
        RTIOS=   1.00    .50


 **********        **********        **********        **********        **********

                            SUB-AREA RUNOFF COMPUTATION

             INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS

                    ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                   011163       0       0       0       0       0       1       0       0
                                        HYDROGRAPH DATA
         IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
             1       2     .21    0.00     .21    1.00   0.000       0       0       0
                                          PRECIP DATA
                    SPFE     PMS      R6     R12     R24     R48     R72     R96
                    0.00   24.50  100.00  120.00  130.00    0.00    0.00    0.00
                                           LOSS DATA
       LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
           0    0.00    0.00    1.00    0.00    0.00    1.00   -1.00  -91.00    0.00    0.00

          CURVE NO = -91.00  WETNESS =  -1.00  EFFECT CN =  91.00

                                     UNIT HYDROGRAPH DATA
                                 TC=  0.00    LAG=   .15

                                         RECESSION DATA
                            STRTQ=    0.00    QRCSN=    0.00    RTIOR= 1.00

          TIME INCREMENT TOO LARGE--(NHQ IS GT LAG/2)

          UNIT HYDROGRAPH 11 END OF PERIOD ORDINATES, TC=   0.00 HOURS, LAG=   .15  VOL= 1.00
```

192. 511. 450. 227. 114. 56. 27. 14. 7. 4.
1.

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.	1.01	12.35	151	.20	.20	.00	318.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.40	152	.20	.20	.00	320.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.45	153	.20	.20	.00	321.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.50	154	.20	.20	.00	322.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.55	155	.20	.20	.00	323.
1.01	.30	6	.01	0.00	.01	0.	1.01	13.00	156	.20	.20	.00	323.
1.01	.35	7	.01	0.00	.01	0.	1.01	13.05	157	.25	.24	.00	331.
1.01	.40	8	.01	0.00	.01	0.	1.01	13.10	158	.25	.24	.00	352.
1.01	.45	9	.01	0.00	.01	0.	1.01	13.15	159	.25	.24	.00	370.
1.01	.50	10	.01	0.00	.01	0.	1.01	13.20	160	.25	.24	.00	379.
1.01	.55	11	.01	0.00	.01	0.	1.01	13.25	161	.25	.24	.00	384.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.30	162	.25	.24	.00	387.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.35	163	.25	.24	.00	388.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.40	164	.25	.24	.00	389.
1.01	1.15	15	.01	.00	.01	0.	1.01	13.45	165	.25	.24	.00	389.
1.01	1.20	16	.01	.00	.01	0.	1.01	13.50	166	.25	.24	.00	389.
1.01	1.25	17	.01	.00	.01	0.	1.01	13.55	167	.25	.24	.00	389.
1.01	1.30	18	.01	.00	.01	1.	1.01	14.00	168	.25	.24	.00	390.
1.01	1.35	19	.01	.00	.01	1.	1.01	14.05	169	.31	.30	.00	401.
1.01	1.40	20	.01	.00	.01	2.	1.01	14.10	170	.31	.30	.00	433.
1.01	1.45	21	.01	.00	.01	2.	1.01	14.15	171	.31	.30	.00	460.
1.01	1.50	22	.01	.00	.01	3.	1.01	14.20	172	.31	.30	.00	474.
1.01	1.55	23	.01	.00	.01	3.	1.01	14.25	173	.31	.30	.00	401.
1.01	2.00	24	.01	.00	.01	4.	1.01	14.30	174	.31	.30	.00	485.
1.01	2.05	25	.01	.00	.01	4.	1.01	14.35	175	.31	.30	.00	486.
1.01	2.10	26	.01	.00	.01	5.	1.01	14.40	176	.31	.30	.00	487.
1.01	2.15	27	.01	.00	.01	5.	1.01	14.45	177	.31	.30	.00	488.
1.01	2.20	28	.01	.00	.01	5.	1.01	14.50	178	.31	.30	.00	488.
1.01	2.25	29	.01	.00	.01	6.	1.01	14.55	179	.31	.30	.00	488.
1.01	2.30	30	.01	.00	.01	6.	1.01	15.00	180	.31	.31	.00	489.
1.01	2.35	31	.01	.00	.01	6.	1.01	15.05	181	.19	.19	.00	466.
1.01	2.40	32	.01	.00	.01	7.	1.01	15.10	182	.37	.37	.00	440.
1.01	2.45	33	.01	.00	.01	7.	1.01	15.15	183	.37	.37	.00	481.
1.01	2.50	34	.01	.01	.01	7.	1.01	15.20	184	.56	.56	.00	573.
1.01	2.55	35	.01	.01	.01	8.	1.01	15.25	185	.65	.65	.00	715.
1.01	3.00	36	.01	.01	.01	8.	1.01	15.30	186	1.58	1.58	.00	1039.
1.01	3.05	37	.01	.01	.01	8.	1.01	15.35	187	2.61	2.60	.01	1801.
1.01	3.10	38	.01	.01	.01	9.	1.01	15.40	188	1.02	1.02	.00	2483.
1.01	3.15	39	.01	.01	.01	9.	1.01	15.45	189	.65	.65	.00	2300.
1.01	3.20	40	.01	.01	.01	9.	1.01	15.50	190	.56	.56	.00	1730.
1.01	3.25	41	.01	.01	.01	9.	1.01	15.55	191	.37	.37	.00	1295.
1.01	3.30	42	.01	.01	.01	10.	1.01	16.00	192	.37	.37	.00	978.
1.01	3.35	43	.01	.01	.01	10.	1.01	16.05	193	.29	.29	.00	769.
1.01	3.40	44	.01	.01	.01	10.	1.01	16.10	194	.29	.29	.00	629.
1.01	3.45	45	.01	.01	.01	10.	1.01	16.15	195	.29	.29	.00	542.
1.01	3.50	46	.01	.01	.01	11.	1.01	16.20	196	.29	.29	.00	499.
1.01	3.55	47	.01	.01	.01	11.	1.01	16.25	197	.29	.29	.00	476.
1.01	4.00	48	.01	.01	.01	11.	1.01	16.30	198	.29	.29	.00	465.
1.01	4.05	49	.01	.01	.01	11.	1.01	16.35	199	.29	.29	.00	460.
1.01	4.10	50	.01	.01	.01	11.	1.01	16.40	200	.29	.29	.00	459.
1.01	4.15	51	.01	.01	.01	12.	1.01	16.45	201	.29	.29	.00	455.
1.01	4.20	52	.01	.01	.01	12.	1.01	16.50	202	.29	.29	.00	457.
1.01	4.25	53	.01	.01	.01	12.	1.01	16.55	203	.29	.29	.00	457.
1.01	4.30	54	.01	.01	.01	12.	1.01	17.00	204	.29	.29	.00	457.

1.01	4.35	55	.01	.01	.01	12.	1.01	17.05	205	.22	.22	.00	446.
1.01	4.40	56	.01	.01	.01	13.	1.01	17.10	206	.22	.22	.00	414.
1.01	4.45	57	.01	.01	.01	13.	1.01	17.15	207	.22	.22	.00	387.
1.01	4.50	58	.01	.01	.01	13.	1.01	17.20	208	.22	.22	.00	373.
1.01	4.55	59	.01	.01	.01	13.	1.01	17.25	209	.22	.22	.00	366.
1.01	5.00	60	.01	.01	.01	13.	1.01	17.30	210	.22	.22	.00	363.
1.01	5.05	61	.01	.01	.01	13.	1.01	17.35	211	.22	.22	.00	361.
1.01	5.10	62	.01	.01	.01	13.	1.01	17.40	212	.22	.22	.00	360.
1.01	5.15	63	.01	.01	.00	14.	1.01	17.45	213	.22	.22	.00	360.
1.01	5.20	64	.01	.01	.00	14.	1.01	17.50	214	.22	.22	.00	360.
1.01	5.25	65	.01	.01	.00	14.	1.01	17.55	215	.22	.22	.00	359.
1.01	5.30	66	.01	.01	.00	14.	1.01	18.00	216	.22	.22	.00	359.
1.01	5.35	67	.01	.01	.00	14.	1.01	18.05	217	.02	.02	.00	320.
1.01	5.40	68	.01	.01	.00	14.	1.01	18.10	218	.02	.02	.00	216.
1.01	5.45	69	.01	.01	.00	14.	1.01	18.15	219	.02	.02	.00	124.
1.01	5.50	70	.01	.01	.00	15.	1.01	18.20	220	.02	.02	.00	78.
1.01	5.55	71	.01	.01	.00	15.	1.01	18.25	221	.02	.02	.00	55.
1.01	6.00	72	.01	.01	.00	15.	1.01	18.30	222	.02	.02	.00	43.
1.01	6.05	73	.07	.05	.02	22.	1.01	18.35	223	.02	.02	.00	38.
1.01	6.10	74	.07	.05	.02	42.	1.01	18.40	224	.02	.02	.00	35.
1.01	6.15	75	.07	.05	.02	60.	1.01	18.45	225	.02	.02	.00	34.
1.01	6.20	76	.07	.05	.02	71.	1.01	18.50	226	.02	.02	.00	33.
1.01	6.25	77	.07	.05	.02	77.	1.01	18.55	227	.02	.02	.00	33.
1.01	6.30	78	.07	.05	.01	81.	1.01	19.00	228	.02	.02	.00	33.
1.01	6.35	79	.07	.05	.01	83.	1.01	19.05	229	.02	.02	.00	33.
1.01	6.40	80	.07	.06	.01	85.	1.01	19.10	230	.02	.02	.00	33.
1.01	6.45	81	.07	.06	.01	87.	1.01	19.15	231	.02	.02	.00	33.
1.01	6.50	82	.07	.06	.01	[illegible]	1.01	19.20	232	.02	.02	.00	33.
1.01	6.55	83	.07	.06	.01	90.	1.01	19.25	233	.02	.02	.00	33.
1.01	7.00	84	.07	.06	.01	91.	1.01	19.30	234	.02	.02	.00	33.
1.01	7.05	85	.07	.06	.01	92.	1.01	19.35	235	.02	.02	.00	33.
1.01	7.10	86	.07	.06	.01	93.	1.01	19.40	236	.02	.02	.00	33.
1.01	7.15	87	.07	.06	.01	93.	1.01	19.45	237	.02	.02	.00	33.
1.01	7.20	88	.07	.06	.01	94.	1.01	19.50	238	.02	.02	.00	33.
1.01	7.25	89	.07	.06	.01	95.	1.01	19.55	239	.02	.02	.00	33.
1.01	7.30	90	.07	.06	.01	96.	1.01	20.00	240	.02	.02	.00	33.
1.01	7.35	91	.07	.06	.01	96.	1.01	20.05	241	.02	.02	.00	33.
1.01	7.40	92	.07	.06	.01	97.	1.01	20.10	242	.02	.02	.00	33.
1.01	7.45	93	.07	.06	.01	97.	1.01	20.15	243	.02	.02	.00	33.
1.01	7.50	94	.07	.06	.01	98.	1.01	20.20	244	.02	.02	.00	33.
1.01	7.55	95	.07	.06	.01	98.	1.01	20.25	245	.02	.02	.00	33.
1.01	8.00	96	.07	.06	.01	99.	1.01	20.30	246	.02	.02	.00	33.
1.01	8.05	97	.07	.06	.01	99.	1.01	20.35	247	.02	.02	.00	33.
1.01	8.10	98	.07	.06	.01	100.	1.01	20.40	248	.02	.02	.00	33.
1.01	8.15	99	.07	.06	.01	100.	1.01	20.45	249	.02	.02	.00	33.
1.01	8.20	100	.07	.06	.01	100.	1.01	20.50	250	.02	.02	.00	33.
1.01	8.25	101	.07	.06	.00	101.	1.01	20.55	251	.02	.02	.00	33.
1.01	8.30	102	.07	.06	.00	101.	1.01	21.00	252	.02	.02	.00	33.
1.01	8.35	103	.07	.06	.00	101.	1.01	21.05	253	.02	.02	.00	33.
1.01	8.40	104	.07	.06	.00	102.	1.01	21.10	254	.02	.02	.00	33.
1.01	8.45	105	.07	.06	.00	102.	1.01	21.15	255	.02	.02	.00	33.
1.01	8.50	106	.07	.06	.00	102.	1.01	21.20	256	.02	.02	.00	33.
1.01	8.55	107	.07	.06	.00	102.	1.01	21.25	257	.02	.02	.00	33.
1.01	9.00	108	.07	.06	.00	103.	1.01	21.30	258	.02	.02	.00	33.
1.01	9.05	109	.07	.06	.00	103.	1.01	21.35	259	.02	.02	.00	33.
1.01	9.10	110	.07	.06	.00	103.	1.01	21.40	260	.02	.02	.00	33.
1.01	9.15	111	.07	.06	.00	103.	1.01	21.45	261	.02	.02	.00	33.
1.01	9.20	112	.07	.06	.00	103.	1.01	21.50	262	.02	.02	.00	33.
1.01	9.25	113	.07	.06	.00	103.	1.01	21.55	263	.02	.02	.00	33.
1.01	9.30	114	.07	.06	.00	104.	1.01	22.00	264	.02	.02	.00	33.

1.01	9.35	115	.07	.06	.00	104.	1.01	22.05	265	.02	.02	.00	33.
1.01	9.40	116	.07	.07	.00	104.	1.01	22.10	266	.02	.02	.00	33.
1.01	9.45	117	.07	.07	.00	104.	1.01	22.15	267	.02	.02	.00	33.
1.01	9.50	118	.07	.07	.00	104.	1.01	22.20	268	.02	.02	.00	33.
1.01	9.55	119	.07	.07	.00	104.	1.01	22.25	269	.02	.02	.00	33.
1.01	10.00	120	.07	.07	.00	105.	1.01	22.30	270	.02	.02	.00	33.
1.01	10.05	121	.07	.07	.00	105.	1.01	22.35	271	.02	.02	.00	33.
1.01	10.10	122	.07	.07	.00	105.	1.01	22.40	272	.02	.02	.00	33.
1.01	10.15	123	.07	.07	.00	105.	1.01	22.45	273	.02	.02	.00	33.
1.01	10.20	124	.07	.07	.00	105.	1.01	22.50	274	.02	.02	.00	33.
1.01	10.25	125	.07	.07	.00	105.	1.01	22.55	275	.02	.02	.00	33.
1.01	10.30	126	.07	.07	.00	105.	1.01	23.00	276	.02	.02	.00	33.
1.01	10.35	127	.07	.07	.00	105.	1.01	23.05	277	.02	.02	.00	33.
1.01	10.40	128	.07	.07	.00	105.	1.01	23.10	278	.02	.02	.00	33.
1.01	10.45	129	.07	.07	.00	105.	1.01	23.15	279	.02	.02	.00	33.
1.01	10.50	130	.07	.07	.00	106.	1.01	23.20	280	.02	.02	.00	33.
1.01	10.55	131	.07	.07	.00	106.	1.01	23.25	281	.02	.02	.00	33.
1.01	11.00	132	.07	.07	.00	106.	1.01	23.30	282	.02	.02	.00	33.
1.01	11.05	133	.07	.07	.00	106.	1.01	23.35	283	.02	.02	.00	33.
1.01	11.10	134	.07	.07	.00	106.	1.01	23.40	284	.02	.02	.00	33.
1.01	11.15	135	.07	.07	.00	106.	1.01	23.45	285	.02	.02	.00	33.
1.01	11.20	136	.07	.07	.00	106.	1.01	23.50	286	.02	.02	.00	33.
1.01	11.25	137	.07	.07	.00	106.	1.01	23.55	287	.02	.02	.00	33.
1.01	11.30	138	.07	.07	.00	106.	1.02	0.00	288	.02	.02	.00	33.
1.01	11.35	139	.07	.07	.00	106.	1.02	.05	289	0.00	0.00	0.00	29.
1.01	11.40	140	.07	.07	.00	106.	1.02	.10	290	0.00	0.00	0.00	18.
1.01	11.45	141	.07	.07	.00	106.	1.02	.15	291	0.00	0.00	0.00	9.
1.01	11.50	142	.07	.07	.00	106.	1.02	.20	292	0.00	0.00	0.00	5.
1.01	11.55	143	.07	.07	.00	106.	1.02	.25	293	0.00	0.00	0.00	2.
1.01	12.00	144	.07	.07	.00	107.	1.02	.30	294	0.00	0.00	0.00	1.
1.01	12.05	145	.20	.20	.00	132.	1.02	.35	295	0.00	0.00	0.00	1.
1.01	12.10	146	.20	.20	.00	200.	1.02	.40	296	0.00	0.00	0.00	0.
1.01	12.15	147	.20	.20	.00	261.	1.02	.45	297	0.00	0.00	0.00	0.
1.01	12.20	148	.20	.20	.00	291.	1.02	.50	298	0.00	0.00	0.00	0.
1.01	12.25	149	.20	.20	.00	307.	1.02	.55	299	0.00	0.00	0.00	0.
1.01	12.30	150	.20	.20	.00	314.	1.02	1.00	300	0.00	0.00	0.00	0.
									SUM	31.85	30.69	1.16	49194.
										(809.)(	780.)(	29.)(	1393.02)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2483.	538.	171.	164.	49176.
CMS	70.	15.	5.	5.	1393.
INCHES		24.19	30.69	30.69	30.69
MM		614.52	779.61	779.61	779.61
AC-FT		267.	339.	339.	339.
THOUS CU M		329.	418.	418.	418.

HYDROGRAPH AT STA011163 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	2.
2.	3.	3.	4.	4.	5.	5.	5.	6.	6.
6.	7.	7.	7.	8.	8.	8.	9.	9.	9.
9.	10.	10.	10.	10.	11.	11.	11.	11.	11.
12.	12.	12.	12.	12.	13.	13.	13.	13.	13.
13.	13.	14.	14.	14.	14.	14.	14.	14.	15.
15.	15.	22.	42.	60.	71.	77.	81.	83.	85.
87.	88.	90.	91.	92.	93.	93.	94.	95.	96.

96.	97.	97.	98.	98.	99.	99.	100.	100.	100.
101.	101.	101.	102.	102.	102.	102.	103.	103.	103.
103.	103.	103.	104.	104.	104.	104.	104.	104.	105.
105.	105.	105.	105.	105.	105.	105.	105.	105.	106.
106.	106.	106.	106.	106.	106.	106.	106.	106.	106.
106.	106.	106.	107.	132.	200.	261.	291.	307.	314.
318.	320.	321.	322.	323.	323.	331.	352.	370.	379.
384.	387.	388.	389.	389.	389.	389.	390.	401.	435.
460.	474.	481.	485.	486.	487.	488.	488.	468.	489.
466.	440.	481.	573.	715.	1039.	1801.	2483.	2300.	1730.
1295.	978.	763.	629.	542.	499.	476.	465.	460.	459.
458.	457.	457.	457.	446.	414.	387.	373.	366.	363.
361.	360.	360.	360.	359.	359.	320.	216.	124.	78.
55.	43.	38.	35.	34.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
33.	33.	33.	33.	33.	33.	33.	33.	29.	18.
9.	5.	2.	1.	1.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2485.	534.	171.	164.	49176.
CMS	70.	15.	5.	5.	1393.
INCHES		24.19	30.69	30.69	30.69
MM		614.52	779.61	779.61	779.61
AC-FT		267.	339.	339.	339.
THOUS CU M		329.	418.	418.	418.

HYDROGRAPH AT STA011163 FOR PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	4.	4.	4.	4.	4.	4.	4.	5.
5.	5.	5.	5.	5.	5.	5.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
7.	7.	11.	21.	30.	35.	33.	40.	42.	43.
43.	44.	45.	45.	46.	46.	47.	47.	47.	48.
48.	48.	49.	49.	49.	49.	50.	50.	50.	50.
50.	50.	51.	51.	51.	51.	51.	51.	51.	51.
52.	52.	52.	52.	52.	52.	52.	52.	52.	52.
52.	52.	52.	52.	53.	53.	53.	53.	53.	53.
53.	53.	53.	53.	53.	53.	53.	53.	53.	53.
53.	53.	53.	53.	66.	100.	130.	146.	153.	157.
159.	160.	161.	161.	161.	161.	165.	176.	185.	190.
192.	193.	194.	194.	194.	195.	195.	195.	201.	216.
230.	237.	241.	242.	243.	244.	244.	244.	244.	244.
233.	220.	241.	287.	357.	519.	900.	1242.	1150.	865.
647.	469.	384.	314.	271.	249.	238.	232.	230.	229.
229.	229.	229.	229.	223.	207.	193.	186.	183.	181.
180.	180.	180.	180.	180.	180.	160.	108.	62.	39.
27.	22.	19.	18.	17.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.

```
      16.       16.       16.       16.       16.       16.       16.       16.       16.       16.
      16.       16.       16.       16.       16.       16.       16.       16.       14.        9.
       5.        2.        1.        1.        0.        0.        0.        0.        0.        0.

                             PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                   CFS      1242.      269.       85.       82.       24588.
                   CMS        35.        8.        2.        2.         696.
                INCHES                12.10     15.35     15.35        15.35
                    MM               307.26    389.80    389.80       389.80
                 AC-FT                 133.      169.      169.         169.
             THOUS CU M                165.      209.      209.         209.


     **********          **********          **********          **********          **********

                                       HYDROGRAPH ROUTING

                 ROUTE HYDROGRAPH THROUGH DEIMEKE LAKE DAM (MO 11163)

                          ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME   ISTAGE   IAUTO
                         011163       1       0       0      0      0       1        0       0
                                               ROUTING DATA
                  QLOSS   CLOSS     AVG    IRES   ISAME   IOPT   IPMP            LSTR
                    0.0   0.000    0.00       1       1      0      0               0

                          NSTPS   NSTDL     LAG   AMSKK      X     TSK   STORA  ISPRAT
                              6       0       0   0.000  0.000   0.000   -768.     -1

STAGE     768.37    768.75    769.20    769.50    771.44    771.99    772.40    772.79    773.32    773.70
          774.45    775.20    776.76

FLOW        0.00       .30      4.00      5.00     23.00     73.00    129.00    199.00    519.00   1044.00
         2656.00   4668.00   9806.00

CAPACITY=      0.        0.        2.        4.        7.       12.       20.       31.       43.       56.
              58.       71.       80.       89.       99.      197.

ELEVATION=   750.      752.      754.      756.      758.      760.      762.      764.      766.      768.
             768.      770.      771.      772.      773.      780.

                        CREL   SPWID   COQW   EXPW   ELEVL   COOL   CAREA   EXPL
                       768.3     0.0    0.0    0.0     0.0    0.0     0.0    0.0

                                                DAM DATA
                                       TOPEL    COQD    EXPD  DAMWID
                                       773.0     0.0     0.0      0.

                                      STATION 011163, PLAN 1, RATIO 1

                                      END-OF-PERIOD HYDROGRAPH ORDINATES

                                                 OUTFLOW
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS	
				RATIO 1 1.00	RATIO 2 .50
HYDROGRAPH AT	011163 (	.21 .54)	1 (	2483. 70.32)(	1242. 35.16)(
ROUTED TO	011163 (	.21 .54)	1 (	2204. 62.41)(	983. 27.83)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	768.33	768.33	775.00
STORAGE	58.	58.	99.
OUTFLOW	0.	0.	326.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	774.23	1.23	116.	2204.	5.00	15.75	0.00
.50	773.63	.63	108.	983.	1.00	15.83	0.00

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION       JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE* 80/08/11.
     TIME* 09.16.26.


                    DAM SAFETY INSPECTION_MISSOURI
                 DEIMEKE LAKE DAM (MO 11163)
                         PERCENT PMF

                              JOB SPECIFICATION
     NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
    300       0       5       0       0       0       0       0      -4       0
                           JOPER     NWT   LROPT   TRACE
                               5       0       0       0

                         MULTI-PLAN ANALYSES TO BE PERFORMED
                            NPLAN= 1 NRTIO= 3 LRTIO= 1
     RTIOS=     .20     .25     .30


     **********         **********         **********         **********         **********

                              SUB-AREA RUNOFF COMPUTATION

          INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS

                   ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                   0111F*      0       0       0       0       0       1       0       0

                                  HYDROGRAPH DATA
      IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
          1       2     .21    0.00     .21    1.00   0.000       0       0       0

                                    PRECIP DATA
                SPFE     PMS      R6     R12     R24     R48     R72     R96
                0.00   24.50  100.00  120.00  130.00    0.00    0.00    0.00

                                     LOSS DATA
      LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
          0    0.00    0.00    1.00    0.00    0.00    1.00   -1.05  -91.00    0.00    0.00

        CURVE NO = -91.00  WETNESS =  -1.00  EFFECT CN =  91.00

                                UNIT HYDROGRAPH DATA
                            TC=  0.00   LAG=   .15

                                   RECESSION DATA
                     STRTQ=   0.00   ORCSN=   0.00   RTIOR= 1.00

          0                        END-OF-PERIOD FLOW
    MO.DA  HR.MN  PERIOD  RAIN  EXCS  LOSS  COMP Q     MO.DA  HR.MN  PERIOD  RAIN  EXCS  LOSS  COMP Q
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                                                                              SUM  31.85  30.69   1.16    49194.
                                                                                 ( 809.)( 780.)(  29.)( 1393.02)

          **********          **********          **********          **********          **********

                                              HYDROGRAPH ROUTING

                          ROUTE HYDROGRAPH THROUGH UEINEKE LAKE DAM (MO 11163)

                                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                 011163       1       0       0       0       0       1       0       0
                                                          ROUTING DATA
                          QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                            0.0   0.000    0.00       1       1       0       0               0

                                  NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                                      0       0       0   0.000   0.000   0.000   -768.      -1

 STAGE        768.33      763.73      769.20      769.50      771.44      771.99      772.40      772.79      773.32      773.70
              774.45      775.20      776.70

  FLOW          0.01         .33        4.00        5.30        7.00       73.00      119.00      199.00      519.00     1088.00
             2656.00     4664.00     7808.00

  CAPACITY=        0.          0.          2.          4.          7.         12.         20.         31.         43.         56.
                  58.         71.         60.         89.         99.        197.

  ELEVATION=     750.        752.        754.        756.        758.        760.        762.        764.        766.        768.
                 768.        770.        771.        772.        773.        780.

                                CREL   SPWID   COQW   EXPW   ELEVL   COQL   CAREA   EXPL
                               763.3     0.0    0.0    0.0     0.0    0.0     0.0    0.0

                                                        DAM DATA
                                              TOPEL    COQD    EXPD   DAMWID
                                              773.0     0.0     0.0       0.

 PEAK OUTFLOW IS       163. AT TIME  16.00 HOURS

 PEAK OUTFLOW IS       344. AT TIME  15.92 HOURS

 PEAK OUTFLOW IS       454. AT TIME  15.83 HOURS


          **********          **********          **********          **********          **********
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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1 .20	RATIO 2 .25	RATIO 3 .30
HYDROGRAPH AT	011163	.21	1	497.	621.	745.
	(	.54)	(	14.06)(	17.58)(	21.10)(
ROUTED TO	011167	.21	1	183.	344.	454.
	(	.54)	(	5.19)(	9.75)(	12.85)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	768.33	768.33	773.00
	STORAGE	58.	58.	99.
	OUTFLOW	0.	0.	326.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	772.70	0.00	96.	183.	0.00	16.00	0.00
.25	773.03	.03	99.	344.	.25	15.92	0.00
.30	773.21	.21	102.	454.	.50	15.83	0.00